a
b
c
d
e
f
g
h
i
j
k
l

a
b
c
d
e
f
g
h
i
j
k
l

Locality 6906 Monterey Fm Clarendonian.
General locality for collection by construction personnel and from dump.

6?. N? NE of 6905 in white sand

Dump or map 6905" (650' SW of N 51,9,424,0/E 1,5'3'5,197,0)
loc 6905 ⟶ San Juan Capistrano Quadrangle
USGS 7.5/1948 Orange Co. Calif.
[Excavation for North American Rockwell Bldg. Laguna Niguel, Orange Co.]

Loc. 6907 Monterey Fm Clarendonian
Automatics plant site on west side of El Lago Road 530' north of point opposite SE corner w/ Avila Road (50' north of Pole # 184225 E)
(1850' NW N 51.0, 424,0/E 1, 535, 197.0) San Juan Capistrano Quad, USGS 7.5/1948 Orange Co. Calif. Zone A [see below]

Loc. 3785 Late Miocene - Clarendonian Monterey fm.
Orange Co. Calif. Latitude 33°34' 08" N
Township Range NE 1/4, NW 1/4, NW 1/4 unsurveyed Sec 16, T. 7 S, R. 8 W
Elevation 390 feet
Map, San Juan Capistrano, USGS 1948 1:24,000 (~~T 7 S R 8 W~~)
field no. L. G. Barnes 708, Mrs. Bell 652
3200 ft West of Aliso Creek in 3rd major tributary gully on N side of an intermittent stream flowing east to Aliso Cr., several rds up gully on E bank in coarse, yellow sand 0.1 mi west of Loc 1101.

Zones

18"	Black alluvium	
2'	Alluv. + gritty yellow SS	
7+9'	Zone A [692] light cream colored gritty SS	692 B beneath east Fanning Bldgs. F underbelly " C " SE corner " "
7-10'	Banded diatomite + gray brown mudstone with diplolites + fish rubble	
6-14"	Zone Blue/Brown mudstone [691]	
?, 4'+	Banded diatomites + mudstones	

Phoca

Coracoid 152 89 – P. lagunensis referred post view, c
Loc 6902 37637 – P. wetmorei referred " " b ant a "
2310 – M. dieguensis " " d —

Loc 6906 Humerus 42653 P. wetmorei type ancon, palmar i
h 15367 M. cedrosensis referred — " — h
Loc 6906 b 32432 P. wetmorei prox end ref. ancon view
~~2326~~ 2331 M. dieguensis " " ancon view
Loc 6906 Ulna e 32429 P. wetmorei prox paratype ant. view
Loc 3185 Carpometa f 32216 " " referred ant "
Loc 6902 Radius g 53907 " " referred palmar

1.6
45 6.5 1.5 4
4 0
25

Ulna

Carpo

Radius

P. metacarpo

M. digiti

P. metac.

M. calif.

4 Carpal with Pisi + Mid pat
Intermed, Postero, anteri, dorsal

2 Ulna
~~Ext~~, external, proxim

1 Carpometacarpus
Intmed

Radius
1 Ext., ~~—~~

Humerus Type
Palmar, external
Humerus - ref - palmar
Comp - humeri
anconeal, palmar

Laguna Niguel-Autonetics Plant, Orange County, California

LACM 6902 At the northwest end of El Lazo Road in Laguna Niguel, 1200 feet northwest of the North American Rockwell Building which is encircled by El Lazo Road, and 800 feet east of Aliso Creek. Fossils are obtained from the basal two to four feet of a coarse yellow sand which directly overlies a laminated gray shale. Strata are essentially flat lying. In the NW¼ SE¼, NE¼ of unsurveyed Sec. 16, T. 7 S., R. 8W. 117° 42' 53" west longitude, 33° 33' 53" North latitude, San Juan Capistrano quadrangle, ~~California~~ 7.5 minute topographic, USGS, 1948 edition, 1:24000. Monterey Formation, late Miocene.

SE¼, NE¼ Sec 16

LACM 6906 Laguna Niguel-Autonetics Plant, Orange County, California

In excavations made for foundation of the North American-Rockwell Building (= U.S. Gen. Services Admin. Bldg.), 3000 feet north of the junction of Aliso Creek and Sulfur Creek. Fossils were obtained in sands and laminated gray shale. In the

? NE¼ (NE½) SE¼ of unsurveyed Sec. 16, T. 7 S., R. 8W., 117° 42' 44" west longitude, 33° 33' 43" north latitude, ~~S~~ ditto

NE¼, SE¼

See other side good data for use elsewhere

AGE AND EXPLANATION OF FORMATIONS IN SAN PEDRO Larry Barnes ms

RECENT	Alluvial and artificial fill
UPPER PLEISTOCENE	Non-marine terrace cover (reddish-brown sand, rubbish)
	Palos Verdes sand (sand, silty sand, gravel)
LOWER PLEISTOCENE	San Pedro sand (sand, silty sand, silt gravel)
	Timms Point silt (sandy silt, silty sand)
	Lomita marl (marl, calcareous sand)
UPPER MIOCENE	Malaga mudstone member of Monterey shale (radiolarian mudstone)
	Valmonte distomite member of Monterey shale (diatomite, diatomaceous shale, diatomaceous mudstone)

\- - -

GEOLOGIC AGES (Number indicates number of millions of years duration)

CENOZOIC: 65		
Recent (15,000 years)		
Pleistocene: 1		
Pliocene: 12		Age of Mammals
Miocene: 12		
Oligocene: 11		
Eocene: 22		
Paleocene: 7		
MESOZOIC: 165		
Cretaceous: 70		
Jurassic: 45		
Triassic: 50		Age of Reptiles
PALEOZOIC: 370		
Permian: 50		
Carboniferous: 70		Age of Amphibians
Devonian: 55		
Silurian: 20		Marine forms
Ordovician: 75		
Cambrian: 100		
PROTEROZOIC: 2 billion		Life?
ARCHEOZOIC: 4 billion		

Characterized by as late part of Clarendonian land mammal stage, correlated with Mohnian foram final stage = Margaritan megainvertebrate stage. Subject discussed in Barnes et al, no allodesmus, no Delmontigus here, as can be to 1965.

Autoneitus ish Comptor fauna?

Loc. 3185 Aliso Creek

Calif. Orange County

Formation: Monterey

Lat. 33°34'08" N Long. 117°43'32" W

Township/Range NE¼, NW¼, NW¼ unsurveyed, Sec. 16 T. 7 S., R. 8 W

Elevation 390 ft

Map. San Juan Capistrano USGS 1948 1:24,000

Field no. Bell V65-2 described by Bell Jan. 10, 1965

" " Barnes 708 " " Barnes 20 Sept 1972

Loc. description: Approximately 3200 ft. west of Aliso Creek in the third major tributary gully on the north side of an intermittent ~~stream~~ that flows east to Aliso Creek, several yards up the gully on the east bank in coarse, yellow sand about 0.1 mile west of LACM 1101

Makaretus Tehontei, Desmus, mammalian

Taxon

Diagnosis.—

Holotype.—

Type locality.—

Desc.

Referred specimens.— — — — —

from LACM 6902

Locality.— LACM 6902 —

Referred specimens.— from LACM 3185

LACM 3185

Coracoid — Remeasure length cora. to tip coracohumeral process

	Nigsel 37437	P. lagi 15287	Type M. cedros. 14377	cedros 15410	M calif.	← M diegensis → Laem 23110	UCMP 45863	Laem. 20677	22699	24998		Ratio comparison to lagi	Cedros	coracoid calif	coracoid chiles		diegensis 2422				
Length glen. scapula post. part to head	20.9 20.9	18.6 18.5	15.9	16.5 16.5	18.6 18.6	17.4 17.6	17.1	17.5	18.6	19.0 19.0	Nigsel Ratio length to	112	131 124	111.8	118 111.8		16.2 16.3				
Br. furcula/post.	10.	—	6.8	7.2	8.6	7.7	8.0	7.9	—		Br. furcula/post.	—	147 139	116.2	130 125		7.9				
diag br. below furcula/post.	5.9 5.8	5.9 6.1	5.4	5.7 5.8	5.9 5.8	5.85	6.1	5.9	6.1	5.9	depth below furcula	106	109 108	124	120.3 110.5		5.5				
Br. sulc below procoracoid	7.1	6.2	5.3	5.4	6.5	6.0	6.1	5.2	5.3	6.1	br below procora.	114	134 131	109	136.9 116.3		5.4				
Depth sulc below procoracoid	5.3	5.2	4.85	4.9	4.35	4.4	4.8	4.5	4.8	5.1	depth procoracoid	110	129 118.5	127	133 127		4.8				
Depth furcula/post to ant. to procoracoid	8.5 8.4	7.9 7.6	6.5	7.1	6.6	6.4	6.4	6.6	6.3	6.3							6.0				
Length coracohumeral facet	10.1	9.2	8.1	8.0	9.3	8.3	8.0	8.2	8.1	9.8							7.8				
Least br.	4.2	4.6	3.9	3.8	3.5	3.6	3.7	4.0	3.8?	3.8							3.5				
ap br.	5.5	5.3	4.6	4.8	4.7	4.8	4.0?	4.7	4.8	4.8							4.5				
Depth below procoracoid	4.0	4.7	4.1	3.8	3.4	3.6	3.5	3.9	3.8	3.9							3.5				
Least to diag br below facet	69.2	77.1	75.7	65.4	58.7	62.1	57.4	66.1	62.3												
Least depth below facet to ant. br.	19.2	23.3	25.8	23.0	18.3	20.4	20.4	22.2	20.4												
Br. below procoracoid to	34.1	33.4	33.9	32.7	34.1	34.1	35.7	29.7	28.4												
Least br. to br. coracoid	76.4	86.9	84.3	79.3	74.5	75.1	?	85.6	?				Coracoid length dig								
Depth furcula/post to length	40.4 40.4	42.4 41.1	40.8	43	34.7	36.3	37.4	37.7	33.8					17.6 17.1							
Br. furc/post to length	48.6	—	42.3	43.6	46.3	43.7	46.7	45.1	—					17.5 18.6							
diag br to length	27.8	32.4	34.0	35.2	31.2	33.3	35.7	33.7	32.8					19.0 16.3							
depth to br. below procoracoid	74.4	80.6	91.4	90.7	67.0	73.3	78.7	86.6	90.3					4)106	17.7						
length coracoid to br.	48.5	49.7	51.0	48.5	50.2	47.2	46.7	46.9	43.6					46 42 41							

Baz. Miguel Plaza at attach of ant. art. lig. vent. clavicle

in Marseille Delétang deltoid specialist at MS dist., end. in Miguel - sp. in mid.

Humerus

	Miguel 42655	P. lag type	M. sector. Type	Cadw. 15367	M deltoid					UCMP 45850		M calip	M Calip. 2574	Cadw 15410	Miguel 32432	deltoid max.	cadw max	Cadw 15382	? 24852 3854	
br. head to sect. → Humerus	23.7%		20.6%	21.1	20.9 2470	20.0 2304	21.3 2695	61.8 61.80	24.3		7731	2577								
Length (ant.)	82.7 1	—	72.4	72.4	85.2	78.9	82.3	—	75.1		—	—	—	—	—	85.2	80.0		75.0	
gr prox br 1	22.2 2	—	17.4	18.1	20.3	18.2	18.2	—	—		18.7	—	19.0	—	21.8	20.3	20.1	20.3	19.0	
br thru head only	19.6 3	—	15.0	15.3	17.7	15.8	15.4	—	—		15.6	—	17.0	—	19.4					
Depth head	8.95	—	7.0	7.15	83	7.15	6.5	—			8.0	—	7.8	—	8.3					
Dist fr thru circumflex canal to gr delto Humeral head	8.4 4	7.8	7.0	6.9	8.0	6.5	6.6	7.0	6.1	7.1	—	6.7	—	7.4	—	8.0		7.2	6.8	
depth sh above ectepi	10.1 8 / 9.6 9.7 5	—	10.8	11.2	12.4	9.9	10.5	—	9.8	—	11.6	13.0 10.2 10.1	—	—	—				8.7	
Length deltoid from head and tr	48.4	—	43.2	45.2	52.6	48.1	41.8	—	—	—	49.6	—	—	—	—					
br sh above ectepi	5.1 6	5.1	4.7	4.1	5.2	4.45	4.4	4.2	4.2	4.8	—	4.8	—	4.5	—			—	4.4	
br ectepi	16.9 7	15.2	15.95	15.2	7	16.2	16.4	16.1	14.3	17.8	—	—	—	—	—					
~~Length~~ br sh at deltoid mid	6.9 3.55 9	—	6.9 4.8	6.9 4.5	6.9 5.55	5.8 4.6	6.2 4.5	—	—	—	4.7	—	—	—	—		dist.			
Br Humerus attachment Cart. lig.	7.2	6.9	6.8	6.0	6.8	6.1	6.0	6.0	6.3	6.8	—	6.5	—	6.6	—		retro dist. sept.		dist. subseq. dist. br	
Br. shaft	6.1	5.9	5.7	4.6	6.0	5.1	4.8	5.0	4.8	5.9	—	6.3	—	5.2	—		9.3			6.6
Retro prox to dist head to prox	26.8	—	24.2	24.9	23.5	23.2	25.2	—	—	—	—	—	—	—	—		8.2			7.0
	88.4	—	89.2	84.8	88.4	86.9	84.6	—	—	—	83.3	—	89.4	—	89.2		29.1			6.6
Depth br head	45.6	—	46.6	46.6	46.8	44.3	42.2	—	—	—	51.4	—	45.9	—	42.8		9.0			6.1
Br dist to Depth	10.1	—	9.66	9.53	9.53	8.25	9.0	—	—	—	—	—	—	—	—		8.3			6.3
Br, sh at ectepi to dist depth sh at	~~60.0~~ 61.7	65.3 99.0	62.7	59.4	64.2	68.3	68.6	60.0	68.9	67.5	—	—	—	60.7	—		cadw 9.6 9.5 9.0			32.4 8.0 6.5 6.6 6.7 6.3
br dist br to dist thru sh above ectepi	115.2	128.8	130.3	128.2	137.0	135.5	127	140.8	135.2	—	150?	—	—	—						6.68
depth deltoid at depth shaft	52.85 105.0	66.0	52.3 120	45.8 124	50.0 119.0	50.0 113.1	50.0 119.2	47.2 —	48.3 112.6	50.2 —	—	47.6 128.8	—	—	—					

Humerus

Measurements Pramancalla from Laguna Niguel - Capistrano

	Humerus 42653 Lvc	Humerus 32432 6906	m. diag max	m. diag ave.	m. cadus. ensio	m. calif.	m. calif. type	Prae mandib lag. type	M. milleri max		LACM 52216 Lvc 185	m. diag max	m. diag ave.	m. cadus max	m. calif. Lvc 1067	Prae mandib post type lag.	Prae mandib ventral lag.		Humerus
A Ant. length	82.8	—	85.2	76.5	180.0	—	est 74.7	—		A Length to dist. symphy.									
Length deltoid	47.5		57.0	51.7	45.3	—	51.9	—		B Length prox M. 1	15.7	15.5	15.3	16.9	17.8	14.0	14.1		
C Depth thru crest	10.3		12.0		10.8	13.0	11.4	—		C Depth prox crest M 1	12.0	11.0	10.3	11.1	11.6	11.9	—		
D Depth below crest	9.5		10.6		9.2	10.6	9.5	—		D Br. prox trochlear	5.45	4.7	4.5	4.6	5.1	5.25	5.0		
E Br. dist end	8.5	—	8.1	7.2	7.2	—		7.8		E Breadth shaft	4.0	3.65	?	3.7	3.8	4.5	4.0		
F Br. prox end	21.8	21.8	20.3	18.7	20.1	19.3	19.3	—		F Depth shaft	4.25	4.8	?	4.7	4.8	4.7	4.2		
G depth head	9.0	8.4	8.2	7.4	7.1	7.8	7.65	—		Ratio E to F	94.3%	76.7	?	78.8	78.2	95.7	93.3		
H Br. shaft above ectepic.	5.0	—	5.2	4.7 (3)	4.75	4.7	—	5.1		Ratio D to C	43.2	42.6		41.4	43.9	44.0	—		
I depth shaft above ectepic.	9.5	—	10.4	9.1 (3)	9.5	10.2	—	7.9		Ratio B to C	130%	141.7%	137.1	144.1	161.0%	117.5%	—		
Ratio H to I	52.6%		51%	49.4 (3)		46.1		66%		Ratio E to D	75.5%	77.6	?	80.7	73.5	86.5%	84%		
Depth ext condyl.	7.5				6.6	—		5.5											
Depth thru mid ectepic	10.1		10.5		9.5	10.7		9.2											
Ht ectepicondyle to ext condyl	17.1		16.1		?	—		15.2											
Ratio BA	59.5		66.7	67.4	62.3	—	68.5	<											
Ratio depth Sh to br. dist end	112.0%		128.5		125.7%			98.7											
Ratio br shaft to br dist end	59%		64.2		65.3			65.3											
Ht ectepicondyle to dist end	49.7		50.3					51%											

Ulna

	N sind	M cedrus typ	M Cedrus 15371	15414	Cedrus 15372	15394	15411	? 2313	dieyana 2064	2248	MM calif 2580
prox depth	11.32	9.2	10.3	—	9.9	10.1	9.85	9.3	—	9.0	9.9
prox br.	7.6[1]	6.4	6.8	7.2	6.85	6.15	6.15	6.4	6.4	6.45	6.55
dorsal sh thru notch	8.0	7.0	7.6	7.2	7.15	7.35	6.4	7.1	7.6	7.0	7.55
br sh same plane	4.9	4.5	4.55	4.6	4.6	4.6	4.2	4.2	4.3	4.3	4.5
depth sh middle	6.34	6.2	6.15	6.3	6.0	5.5	5.5	6.15	6.6	—	6.7
br sh same plane	× 4.2[3]	× 4.0	× 4.9	× 4.0	× 4.0	× 4.2	× 3.4	× 3.8	× 3.8	—	3.8
prox to sh depth	67.39%	69.67%	66%	—	69.3	60.7	69.4	68.7	—	70.6	65.3
br sh mid to depth prox	37.2	43.4	47.6	—	40.4	41.5	44.1	40.8	—	—	38.4
Depth thru notch to prox br.	105.1	109.1	111.2	100.0	104.2	107.2	104.0	111.0	108.8	109.2	115.2
br to depth sh middle	66.7	64.6	79.6	63.5	66.7	64.7	71.0	61.7	55.9	—	56.6
depth sh mid to depth prox	55.6	67.4	59.6	—	60.6	64.4	62.2	66.1	—	—	67.6

Radius

	N sind	Type Cedrus	calif 2579	dieyana 2486	chuckwalla x cerv 2812	Cedrus 15392	Cedrus 15364	dieyana UCMP 46014
pr light	3.58	28.0	29.7	29.6	31.7	29.9	27.3	31.3
dist light	33.6	26.7	28.25	28.2	30.0	28.8	26.0	29.5
Width sh	5.85	5.58	7.1	6.3	6.3	6.0	5.6	6.2
br sh	3.0	2.9	2.3	2.4	2.4	2.5	2.6	2.7
br dist	× 5.8	× 5.3	× 5.3	× 5.1	× 5.3?	× 5.3	× 4.9	5.35
br sh above dist	4.3	4.0	3.9	4.3	4.7?	4.6	4.0	4.9
br prox	4.9	4.0	3.8?	3.9	4.6	4.5	4.7?	
depth prox	5.5	4.7	5.1?	4.8	5.8	4.2	4.6?	
least to gr length	93.9	95.4	95.4	95.4	94.7	95.4	95.4	
sh depth to gr length	16.3	19.8	23.9	21.5	19.9	20.4	20.5	
Br sh to br dist	91.4	75.5	73.6	84.4	96.0 x3	86.8	81.5	
Br sh to br above dist	56.6	72.8	59.1	55.8	51.2	54.3	65.0	
depth sh to least length	17.8	20.8	25.1	22.3	21.0	21.1	21.5	
Br dist to least length	17.2	19.8	18.7	18.7	16.2 x2	18.6	18.8	
br to depth sh	51.4	52.3	32.4	38.1	38.1	41.6	46.4	
br sh to least length	8.95	10.8	8.8	8.23	8.1	8.8.3	10.0	
Br dist to least length	15.8	15.0	13.8	15.2	15.6	16.15	15.4	

Ulna — Radius — Measurements Pranicaldella pan — Lapua nipuel

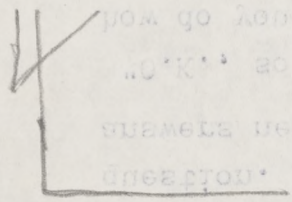
	Nipuel	M. calif	Ulna m. diagonal max	ulna m. diagonal aver	ulna m. diagonal min	Ulna m. cochleariform max	Ulna m. cochleariform aver	Ulna m. cochleariform min	Phae man caliet las.			Loc 6402 Nipuel	M calif	coracoid remeasure m. diagonal max	coracoid remeasure m. diagonal mean	coracoid remeasure m. diagonal min	M. coracoid max	M. coracoid mean	M. coracoid min	P. lap.
ulnar Depth pux	11,1	pub set 10.7					supe? 9.5		none		Brew prob (facet & head)	20.5	18.8 pub. 17.3		15.5?	17.45?	17.0?		16.2?	pub 18.3
Br. pux	7.5		6.6				supe? 7.3				Br. across trochanter	5.85	pub 5.9	6.3	5.8	5.4	6.0	5.8	5.4	pub 5.9
Ratio	67.5		71.6%				75.9%				least br. circumf. pulp	4.1	3.5		3.5			3.8 3.9		4.6
											br. perpendic to facet	10.1	pub 8.7		8.7 8.4?			7.3? 7.4		—
											br. at below coracoid	7.0	6.6		5.0 5.9			5.5 5.3		6.8
		Remeasure radius									depth at sup. groove	5.05	4.4		4.7 4.5			4.5 4.8		5.0
Radius length (long)	33.5	pub 29.7	31.8	30.9	29.6	31.1	29.3	27.3	none		ap. at coracobrach.	6.1	4.7		4.7 4.3			5.0 4.6		pub 4.1
ap. depth at supe	5.8	pub. 6.8	6.4	6.3?	6.3	6.1	5.6	5.4	none		length coracobrach.	10.2	8.5		8.1 7.6			8.2 7.7		8.0
Ratio depth/length	17.3%	22.9%	20.1?	20.6?	21.3?	19.6?	19.2?	19.8?	none											
Br. at least	3.0	2.3		2.4?			supe? 2.8?		none											
Br. across deepest	3.0																			
Dist br.	3.7																			

Carpometa

with the exception of a single (max) specimen of lumen of digeum P. mehmoreii exceeds all other recorded maxillaries material. The max digeum lumen is greater in length only. all other measurements are smaller.

	Angul	pantic lag 15287	lat 15290	Cadw 15391	Cadw 15392	calil 25578	2033 calil 22483	digeum 3541	digeum 2542		carpometa	log.	diag	Cadw	Calif
length M1	15.7	14.0	14.1	(15.4) 15.6	15.45	17.50	17.4 16.3	15.15	15.4		Ratio				
depth ant.	12.1	11.9	—	10.1	10.35	11.0	11.7 —	10.8	10.8		depth Nig to	103%	112	117 120	110
qr to tuch	5.4	5.2	5.0	4.5	4.6	4.7	5.0 5.1	4.6	4.5		length M1	109 112.5	104 102	101 102	89.5 96.6
keel to tuch	3.1	3.3	2.9 3.1	2.8	2.8	3.2	2.8 3.1	2.8	2.75		to tuch	104 107	117 120	120 117	115 106
Depth thr M2	4.3	4.4	4.0	3.9	4.3	4.3	4.6 4.6	4.6	4.5		humeur				
depth M2	4.3	4.4	4.0	3.3	3.35	3.0	3.8 3.5	3.4	3.4		depth	—	99.4 104.2	114	—
Depth ant tuch only	8.2	7.2	—	6.5	7.2	8.4	8.0 9.1	8.2	7.3		to deich	107.9	103.9 139.5	120.2 113.4 121.4	—
Narine ext.	7.0	6.45	6.2	6.4	7.1	7.4	7.2 7.6	7.4	6.5		to prox	—	111.0 122.0	124 123	116.9
Depth prox to length M1	76.7	84.0	—	64.7	67.0	63.3	—	71.8	70.2						
Br. in M2 to qr. to tuch	74	84.6	78.0	86.6	93.3	91.5	90.1	100	100						
length tuch to br. in M2	77.5	75.1	79.4	84.8	83.5	106.5	88.7	80.0	80.9		ulna				
keel to qr. to tuch	57.5	63.5	62.0	62.2	60.4	69.2	60.8	60.8	61.2		depth prox	—	121.5 138.0	127 109.5	?
Depth ant tuch to length M1	43.5	46.4	43.1	41.0	46.0	42.1	46.4	?	42.2		to prox	—	114	105.5 123.5	—
to tuch to length M1	34.2	37.3	34.7	28.8	29.8	27.0	31.2	30.3	29.2						
Br tuch to depth prox	44.4	44.4	—	44.4	44.5	42.7	—	42.6	41.6		radius				
br to depth length M2	97.4	100	100	84.5	77.9	69.7	76.3	76.3	75.6		least length	—	119 112	129 118	119
Br shaft to length M1	25.4	31.6	27.1	21.8	22.7	17.2	21.2	23.1	22.1		qr length	—	121 113	131 119.5	121
Length M1 to depth prox	130%	117%	—	159	149	160	141 —	140	142						
length M1 / above	7/	8/6	17/7												

The ulna (32427) is assigned to the Mancallinae as distinguished from the typical alcids on the basis of the rounding of the palmar surface of the shft, the rotation of the brachial impression palmad and the shortening of the lip of the external cotyla. In these characters, the specimen resembles Mancalla. Distinction from Mancalla is obvious in the prominent and distinct olecranon extending proximad beyond the articular cotylae and set off from them and the shaft by deeps depression both externally and internally. Though the olecranon is generally heavier than in Lunda, the adjacent lateral depressions are similar to Lunda. Attachment for the anterior articular ligament is an uneven raised area following the rim of the internal cotyla to its palmar edge (not a narrow scar running down the shft as in Lunda or Uria); the condition is similar to that found in Mancalla, but less pronounced. Brachial impression depressed and located below the palmar edge of theinternal cotyla; less depressed i mancalla.



Uria

HORSES

"Dad, do you think American history would have been different if horses hadn't disappeared here before the Indians came?"

"Well, Bob, there's a poser! What brought that up?"

"Oh, the Archeology class has been studying early domestication of animals and when we got to horses, the prof asked that question. He wants us to think about it and come up with some answers next week."

"O.K., so you want me to be your straight man. First of all, how do you know horses ~~had~~ disappeared in America before the Indians came? There certainly is a fine fossil record of equines here for millions of years."

"Sure, for millions of years, but there's not a single record in any prehistoric Indian site. All kinds of other animals but no horses. And the early Spanish explorers found none here. That's why they brought their own."

"Next question. What's the earliest record anywhere of man's contact with horses?"

"That's easy. Stone Age garbage dumps in Europe had thousands of horse bones. Those old guys really were high on filet of filly. And, you know, they made those neat cave paintings of horses we saw in Spain last year."

"But what about domestication -- raising horses to use not to eat?"

"I guessthat was a lot later. At least there's no record of it until about 2500 B.C. Stone Age man was nearly 25,000 years earlier. Anyhow, Mesopotamian art shows horselike animals pulling a kind of cart. And, of course in the 14th century B.C. King Tut had some real prancing nags for his chariots."

"What's this about carts and chariots? That means wheels, doesn't it?

"Wow, Dad, you're way ahead of me. But I dig you! That's the answer, the wheel! These people who really began to make use of horses were in a stage of civilization way beyond the American Indians. The early Indians would probably just have gotten fat on horse meat like the Stone Age men, ~~Europeans~~, and American History wouldn't have been any different."

"You've made a good point, son. But maybe the Indians would have been smarter than the Stone Age ~~man of~~ Europeans. They might have come up with a cart if there had been a good horse to pull it."

9.12.74 Length ulna 29.6 type Maucalla cedrosensis

Least Length radius 27.0 " " "

Ratio ulna to rad, 109,9% " " "

Least Length radius from 6902 – 33.5 mm.

109.9% of 33.5 = 37.7 mm estimated length of ulna from 6906 from abaxial edge of facet to external crest of tuber

rationadius of M. diegensis # 5-3907 30.8 to 33.5 = 92% ratio

ratio ulna of " " " est. @ 92% (32.9) = (35.8 = est. length #32429)

A right proximal end of ulna #32429 from Loc 6906 is assigned to the Maucallidae, as distinguished from typical Cricetidae (Cricinae, Sigmodontinae) on the basis of the rounding of the palmar surface of the shaft, and the rotation of the brachial impression palmad and the shortening of the lip of the ext. coryla. Distinction from Maucalla is obvious in the prominent distinct olecranon extending proximad of the articular facets and set off from the facets + shaft by deep depressions both ext. + int. Though a generally heavier process than in Lunda, the adjacent lateral depressions are similar to Lunda, the attachment for anterior articular ligament an uneven raised area following the rim of the int. coryla to its palmar edge (not a narrow scar running down the shaft as in Lunda or Urira) Similar to Maucalla but less prominent. Brachial impression depressed and located below the palmar edge of the int. coryla. Less depressed in Maucalla

	#32429	M. cedrosensis	M. cedrosensis #2330	M. diegensis #2323	M. diegensis #2248
Max. prox. end	7.4	6.3	6.5	6.5	6.6
Depth int. cor.	6.5	5.5 (87.3%)	6.2 (95.4%)	5.5 (84.6%)	5.5 (83.4%)
Depth thru olecranon	11.4	9.3	9.9	9.2	9.0
Least br. shaft	4.2	4.0	3.8	3.7	4.0
Depth same place	6.2	6.1 (66.8%)	6.5 (56.5%)	6.2 (59.6%)	6.3 (63.5%)
% Depth/length	63.2	29.5		29.6	
Length					
Ratio prox to shaft		21.4%		24.2%	

Est. length #32429
based on diegensis 33.7
" " cedrosensis 34.6 mm
" " olecranon 36.2 or 36.8

ulna

(6902, 6904, 3185)

Two localities in Laguna Niguel have yielded wing bones assignable to Praemancalla. It is not clear, however, whether the species represented is P. wetmorei P. laguneusis. No! Describe new sp. Praemancalla wetmorei

		Praem. laguna not available	Mancalla diegensis
AA Length	82.8		85.2
A Br. dist. end	8.5	(Type P. lag. 7.8)	8.1
B Dist. top of ectepi. to dist. end	17.0	(" " " 15.3	16.1
Ratio Ratio Br. prox. to length	26.4%	not available	23.8% (Puiguius 20.6
C Depth sh. above ectepi. prox.	9.5	(Type P. lag. 7.7)	10.4 avn. mancalla 24.4
F Br. sh. to farthest condyle	7.3	(" " " 7.5	10.4
D Br. sh. same place	5.0	(" " " 5.1	5.2
Ratio D to C	52.6%	(" " " 66.0%)	51%
E Breadth prox.	21.8	not available	20.3mm
F Depth head	8.9		8.2

Carpometacarpus			Puiguius
A Length M1 prox.	15.7	(" " " 14.0 - 14.1) (alcodes 7.3)	13.0
B Depth prox. mid (ant.)	12.0	(" " " 11.9 ——— (alcodes 8.0)	14.0
C B. trochlea (prox)	5.3	(" " " 5.2 - 5.0) (alcodes 3.8)	6.5
D Br. sh. M2	4.0	(" " " 4.5 - 4.0)	
E Depth " "	4.25	(" " " 4.7 - 4.2)	
Ratio D/E	95.2%	(" " " 95.7 - 95.2%)	Puiguius
" C/B	43.2%	(" " " 43.6 ———) (alcodes 47.5%)	46.5%
" A/B	130%	(" " " 117.2% ———) alcodes 91.%	93%
" D/C	75.5%	86.5% - 84%	

Specimens assigned are: Humerus 42653 nearly complete, Loc 6904
but unfortunately lacking the anconal area distally; humerus 32432 prox end only; ulna 32427 proximal end (half?).

Loc. 3185, Carpometacarpus 52216, prox 9/10? (apparently only extreme dist. and mesial)

Loc. 6902, Coracoid 37637, upper end, very large

	Prae. (42653)	Mancalla 2470	Mancalla 147	Mancalla 2314	Puiguius ulna	Puiguius ulna
Humerus a length deltoid crest	47.5	52.7	42.4	45.6	61.5	35.0
cont'd b gr - depth thru crest	10.3	12.3	10.2	10.0	12.7	7.6
c gr " below (imed.) "	9.5	10.7	8.8	9.0	11.6	7.2
d. Dist length	82.8	85.2	70.9	75.0	113.4	69.0
ad	57.4	62.0	60.0	60.6	52.5	40.2
ba	21.7	23.3	24.1	22.4	20.7	20.8
bc	108.5	115.0	116.0	111.0	109.5	108.0

(3) the fractural impression ~~through~~ is short ⊤ palmad in position as in Mancalla but is more clearly depressed

Ulna Depth prox'ly through olecranon 11.1 (man. calif $\overset{\text{max}}{9.2}$) M. cedros 9.5

Br. prox cotylar 7.5 (Mancalla max, 6.6 Ratio 71.6

Ratio 67.5% M. cedrosis 7.2 Ratio 76.6

Carpo. Depth prox'ly (internally) 12.0 (man. calif. 11.8 } max.s.

type 11.9 deg. 11.0 }

adhr. 11.1 }

Humer Prox breadth 22.2 (mane. all sp. max. 20.3)

length 82.8 (" dieg. 85.2)

Br. dist. type 7.8 } (mane 8.0 max)

Ratio prox & length 27.80 nigue 8.5 }

Ratio dist & length 10.2

Humerus Many of the characters that define P. lagunensis are obscure away in the nearly complete humerus (#42653) now at hand. The specimen areas pumice, agrees with the type of lag. as follows:

① ectepicondylar separated from ext. condyle at its base

② distal end less compressed than in Mancalla [ext condyle terminates more medial than mancalla

③ fractural impression slanting from palmar & internal surface (in Mancalla more dorsally palmad)

④ radial papilla at palmar top of radial condyle.

52% br/depth shr

The shaft in humerus, is not as heavy as in the type, relative breadth & depth at point above ectepicondylar process is 52% as contrasted with 66 % in the type.

The specimen is also longer (br dist end 8.5 as contrasted with 7.8 for type.

Humerus Ratio depth shr & Breadth dist end

Nigue humerus 110-1% type Pramuc. M. calif M. dieg. M. cedros M. nullei

98.7 128.1

approx. 4 mi SW of 1945

Wing elements of a Mancallid type of auk are found at three sites in Laguna Niguel: 6902, 6906, and 31855. At 6906 there are two humeri (one a proximal end only (32432), the other complete except for proximal contours of distal end (42453)) and an ulna (32429); at 6902 an incomplete coracoid (II 37637) and radius 53907; and at 31855, a single right carpometacarpus (52216) lacking distal end.

Carpometa. The carpometacarpus resembles the paratype of Praemancalla [lagunensis] in the following characters: [long, straight process of M 1] presence of small blunt fossiform process, trochlear area with narrow, deep groove between ext + int crests posteriorly, ratio of shaft breadth to depth greater than 95:20; shaft angular on internal surface.

The specimen differs from the paratype of P. lagunensis in having a longer process of M 1, nearly half of the length distal to the symphysis

Chest this [Possibly deeper groove between trochlear crests posteriorly]

Ulna Two ulnae of Praemancalla have previously been discovered. The specimen at hand is assigned to this genus on the basis of the same degree of variation from Mancalla as is obtained in the known elements:

① The olecranon though blunt as in Mancalla is more proximally + anconally extended, + area but the tip is not so depressed. + the corylae is more depressed.

② The palmar lip of external corylae is slightly more developed though still lacking the extension found in typical alcids or even Pinguins

Praemaucalla Wetmorei n. sp.

Distinctions from Praemaucalla lagunensis

3185
52216 Calyptenetaraptus: Longer proc M1, more than half below proc semiglyzo; sh M2 narrower rel. to br. trochlea

Ratio of length of pisces of M1 to depth proximad
130% (P. lag. 117.2% or 120% defendable on how measured; Mauc. ——

Ratio br sh M2 to br. trochlea
75.5% (P. lag. 84-86%; Maucalla

6906
42653 Humerus shaft narrower rel. to depth

Ratio
Br. sh. rel. to depth shaft distally
52.0-53% (P. laguneusis type 66% ; M. dieg 49.5-50; M. calif. 46.5

Br. sh rel to br. dist end
60% (P. lag. type 65.5; M. dieg 65.0; M calif. ——

Depth sh rel to br. dist end
113% (P. lag. 98.7; M. dieg. 132; M. calif.

6902
37637 Coracoid

Triossial canal bares more post'ly than int'ly (as in Maucalla)
and has a definite keel

Coracolumeral surface though flat as in P. lagunensis (not twisted as in Maucalla) is longer than P. lag. & narrows below
(P. lag. is short & broad thruout) Mauc. dieguis & milaii on the narrow
M. cedrosensis is a bit broader.

Glenoid facet is large & flat; in Prae. lag. large & slightly
convex; Maucalla narrower & very convex

Carpometacarpus 52214 from loc 3185 (Mex. Alto Creek area Laguna Miguel)

Ceffus columba		52214	loc 2021 32321	Paradupe P. lagmeri	Gp. Auk, at Arkansaw		Laguna Miguel Unia
3.5	Length process MI	15.7	15.1	14.0	12.7	15.2	8.6
9.0	Depth through MI (with)	12.0	13.0	11.7	14.0	11.0	10.2
4.4	Pr. fury trochl.	5.45	6.7	5.25	6.5	4.45	5.45
5.7	Dist. edge trochl to top of pisiform	7.3	7.25	6.9	7.0	none	5.85
1.8	Length pisiform proc.	4.0	3.3	4.0	3.5	none	2.2
7.35 & MI below process	Distance top pisiform to distal edge proc. M 1	11.8	5.5	9.0	10.0	—	6.2
10.0	Distance pr. trochl. (int.) to dist. tip proc. M.1	19.4	12.4	17.4	18.3	18.5	11.4
13.2	Ratio length proc. to dist. pr. trochl. and tip proc.	80.8%	41.2%	80.15%	69.2%	83.2%	75.6%
even with M1, slightly behind process	Distance pr. ex. point of contact M 2 + M 3 to dist. end proc. M.1	6.8	process even or slightly above symphysis	7.8	4.8	8.8	practically on level
	Ratio to dist. trochl.	43.2		93.7	91.8	65.78	130%
	Ratio length proc. to dist. pr.	131.9%		120%	90.5%	138.2%	84.5%

New Co. Carpometa.

loc. 2021

32321 from Jewett sand (Tor. Mus.) shows no indication of flight ridges. The proc. of M1 is short + square as in Cepphus, not even as long (actually or relatively) as Uria. The process is shorter than the width of MI whereas in Mancalla + Praemancalla the two are co-extensive. Thus 32321 is a stout Alcid not mancallid. Note: Even in Uria which has a long process, the process stops above the facet for digit I

Orange County carpo.

52214 from loc 3185 Laguna Miguel – Alto Creek.

Has the long process MI of the Mancallidae + the developed pisiform process of Praemancalla. The process of MI is longer than the pisiform process than in the paratype of P. lagunensis on the paratype. Also below the pisiform than on

Carpometa.

45.4
44.4
40.4

Ulna nos 32429 &c, 6906

This ulna has the convex palmar surface of the shaft proximally as in Maucalla with a distinct long ridge separating the very small area of the brachial attachment from the ext side of the palmar surface. The brachial area seems to lie below the cot. cotyla rather than cot, to it on the side of the shaft

The cotylae are smoothly rounded, in distinction to the condition in Uria in which they are "sculptured" They are more like Maucalla & Pinguinus. The more blunt than Pinguinus

The olecranon, tho heavy & blunt as compared to Uria is more prox. projected than Maucalla

Maucallid features of ulna

Heavy olecranon with blunt tip

Smoothly contoured cotylae with cot cotyla lacking long pointed palmad projection

Palmar face of shaft slightly convex with strong palmar ridge nearly central (Even Pinguinus) with flattened palmar surface (shaft) + radial position + brachial attach. ~~area~~ ~~extending~~ ~~proximally~~ pointed

Brachial impression short + palmad in position less basilar than Pinguinus & like Uria but much shorter

Distinguished from Maucalla

Olecranon more developed ~~in~~ in prox. extension + more rounded on either side — more clearly set off from shaft

Each cotyla with slight palmar "lip" tho blunt (not pointed as in other alcids, including Pinguinus)

Ratio
br/depth shaft 51.6%
463 Pinguinus
60.3 Maucalla
61.4

Meas of ulna Br-cotylae 7.5 mm, depth Horse olecranon 11.2
4.5 X 6.4 br/depth shaft below brachial impression
Ratio br prox & depth - 67% (76% abraded) (Maucalla 69%) (M. adnexus 68.5%)
" " br depth shaft 57% (64% ") (Maucalla dresseri 60% - 59%) (adnexus 61%)

ULNA

Triceps

Deltoid

Biceps

Brachialis ant. artic. lig.

Pectoral

Deltoid minor (ant. side pectoral (deltoid ant) prox'lly

Carpometacarpus 52216 (Loc 3185).

Manudid clavis

long straight process M 1

Narrow facet for digit 1

Prox. contour of trochlea flat

Calcids concave (and Pinguis

Distinct from Manudella

already put in paratype

- Pisiform process present + rel long + blunt as in Pinguis rather than short + ptd as in alcids
- Trochlea less compressed postly with deeper groove between crests

Different from paratype

Ratio of length of M 1 to depth 128%

Paratype 119%

manudella cal. 148.9

" dig. 139.0

126

11.9) 148.0

119

310

238

720

119

110) 126

110

16

More than half M 1 below prox symplysis

→ shaft less bladelike (broader rel to depth) + with [more angular internal contour] [pubertus]

Resembles ~~alcids (Cepphus)~~ Pinguinis in shaft character; NOT as broad however as flippy alcids such as Uria

11.8) 177.

118

590

Compare to

	Mancalla – Procoracoid?	I 6902 37637	II coracoid 1067 cast 2581	III dupuyi 1080 2310	IV multi 1080 2229	V Crash 1945 15289	Cedro – 63148 15378	63150 15410
A	Least Breadth coracohumeral surface	4.0	3.4	3.4	3.2	4.7	3.9	3.9
	Ratio H to $\frac{6902}{37637}$	—	85.90	90.7	61.7	88.2	78.3	83.4
B	Length coracohumeral surface	11.0	9.5	9.2	9.2	8.1	7.4	7.2
N	lg/length glenoid fac	5.9x10.8 54.90	4.7x8.4 56.90	4.75x8.6 55.2	4.0x6.7 59.6	5.4x8.6 62.1	5.1x8.5 60.0	5.2x8.7 59.6	5.3x8.2 65.2
C	Greatest brdth coracohumeral surface	6.0	4.9	4.6	4.0	5.7	4.8	4.8
K	Least br. shaft	6.6	6.1	5.3	4.5	6.0	5.2	5.3
D	Length combined coracohum. surface	19.8	16.4	15.8	12.7	17.0	14.35	15.5
T	glenoid facet							
?L	Depth head post'ly	5.0 5.8	6.4 6.8	5.5 6.3	4.8 5.0	7.5	5.4	6.5
E	Length glenoid facet	11.2	8.6	8.8	7.0	8.9	8.7	9.0
F	Br same	6.0	4.5	4.7	4.1	5.7	5.3	6.1
G	Br trans. Canal	5.9	5.8	5.8	4.6	5.9	5.2	5.7
M	Depth thr. coracoid canal	4.0	3.4	3.5	3.3	4.7	4.0	3.9
H	Distance from lateral scapular facet to head (ext.)	20.4	17.3	18.5	12.6	18.0	16.24	17.0
J	Length dp. below prem.	5.0 69.5	4.2 75.90	4.4 69.7	8.9 86.7	4.6 74	5.0 91.7	4.9 92.5 90
I	Br. shaft below procoracoid	7.2 90	5.6	6.3	4.5	6.2	5.45 91	5.3
	Ratio AC	66.5	69.5	74.0	80.0	82.5	5'3	5'4.0
☆	Ratio CB	54.5	57.7	49.9	55.0	70.3	64.4	66.6
☆	Ratio BD	55.6	58.9	58.1	54.2	47.5	51.6	46.5
	Ratio FE	53.5	52.4	53.4	58.6	64.0	60.4	68.0
	Ratio GH	28.9	33.8	31.9	36.5	32.8	32.1	33.5
	Ratio IG	121.0	96.0	108.0	94	105.0		
	Ratio JI	69.4	75.0	69.8	86.8	74.1		
	Ratio IH	35.2	32.3	34.0	34.7	34.4		
	Ratio AD	20.2	20.8	21.5	25.2	27.6		
	Ratio ED	56.4	52.4	55.6	55.2	52.3		
	Ratio LH	41.5	39.3	34.0	39.6	41.5		
☆	Ratio MG	47.8	58.0	60.5	71.7	81		
	Ratio DH	97.3	94.7	85.3	100.0	94.5	88.4	91.3

CORACOID

Coraco

The humerus ~~variables~~ parameters ~~the~~ the following

	Nigel	2310 dieg.	dieg.	Ucmp45843 mulen	lag.	Type 15373 cedro	15410 cedro	calif
Ec below proc								
a br. shaft	7.1	5.7	5.0	4.6	5.1	6.0	5.4 53	6.2.5
b left shaft	3.18	4.6	4.0	4.4	4.0	4.11	5.11	4.4
rostr ab								
c br. humeral head	7.8	7.1	6.5		6.0	6.7	6.4	4.65
d ant edge	91.1	86.3	76.8		85	89.5	82.9	94
ratio a c								

The furcular facet protubs + anchors in the Nigel specimen as in lag. It does not protrude + the anchors is less abrupt the two canal edges faces more out ly

	Nigel	2310 dieg.	dieg.	Ucmp45843 mulen	lag.	Type 15373 cedro	15410 cedro	calif
br shaft just below a facets	6.75	5.4	4.8.5	5.1	5.9	5'9.5	5'.45	6.0
br sh below procora b	7.0	5.9	5'.05	5.1	6.4	5'.5	5.3	6.6
depth sh c below procora.	5.05	4.5	4.7	4.0	5.0	4.8	4.8	4.4.
Br. furcular facet d	10.1	8.45	8.7	5.11	—	7.4	7.3	8.2
br tub	5'8.5	5.8	5.9	4.8	6.0	5.0	5'.75	5'.8
length fm below scap facet to head	20.5	17.45	17.45	14.4	18.5	15.7	16.25	18.7
b/c	34.2	33.8	29.9	34.8				1.15
d/b	72.8	76.3	94	78.6	78.3	87	8.8	66.5
Br. coraco humeral rufac	6.1	4.7	4.3	3.7	5.35	5.0	4.6	4.7
length scap to tip deltoid facet	10.2	7.4	8.1	7.5	8.0	8.2	7.75	8.5
length to coraco	4.1	3.5	—	3.3	4.6	3.8	3.9	3.5
ratio cf	28.6%	33.3	33.8	32.9	32.4	31.9	35.4	31.0
" xy	59.6%	61.4	53.20	48.4	64.8	61.0	59.4	55.3
ratio x2	103.5	81	74	77	89.3	100	80	81.1

Coraco

Measurements of humerus

	Nigual 1	Nigual 2	lag.	typic M. cadav.	2620 2304 M. dieg.	2096 M. milleri	M. calli
A Br. dist. ext.	8.5		7.8	7.1	8.0 4.5	5.9	—
B Depth ectepi condyle to ulnar edge of ext. cond.	7.2	—	5.4	6.5	8.2 6.5	5.4	—
C Depth shaft above ectepi proc.	9.5		7.8	9.1	10.3 8.9	7.8	10.1
D Br. shaft same place	5.0	—	5.1	4.7	5.2 4.4	4.0	4.7
E Ht ectepi proc.	17.0	—	15.0	15.9	— 16.6	12.8	—
F Depth ectepi condyle to ulnar border of shaft	10.2	—	9.2	9.8	10.6 9.6	8.2	10.7
G Br. prox end	22.0	21.6	—	17.4	20.2 17.9	15.6	19.1
H Br. prox head	19.5	18.6	—	13.1	18.3 15.9	13.6	17.2
I Depth head	9.0	8.1	—	7.1	8.2 7.2	6.4	7.8
J Length (ext)	82.75	—	—	82.8	— 78.8	63.9	—
K " to int cond	82.7	—	—	82.3	85.1 78.3	63.5	—
BA	84.7%		69.3	91.4	102.9% 100.7%	91.7%	46.5
DC	52.6%		65.5	51.7	50.5 50.0	51.4	—
FE	60.0%		61.3	61.3	— 57.9	64.0	—
DA	58.8		64.4	51.6	64.9 67.7	68.0	—

Regarding the shape both the ectepicondyle + the ext. condyle

This is broad + long in lagunero

less broad + thin in calli + placed at angle + vertical due to curvature

Very pendent + short in dodsonensis + vertically placed (condyle vertical)

Varies proximally in dieg + milleri + very short

Nigual specimen?

Open cervix

Coracoid 6702
37637

	37637	Praemanc. lg.	Mancalla calif.	M. diegens	M. milleri	M. cedrosensis
coracohumeral surface length	10.8	8.2	9.3	8.6	7.1	8.8
" br.	4.1	4.65	3.4	3.45	3.2	3.9
gr. br.	6.4	8.1	4.7	4.5	3.8	4.8
Ratio br to length	64%	96.39%	72.3%	76.8%	84.3%	81.3%
Ratio gr br. to length	38%	56.6%	36.7%	40%	45.9%	44.7%
Ratio gr br to length	59.3	62.3	50.5	52.3	53.5	55.1

The coracohumeral surface in 37637 is flat & long & straight, notably narrower near glenoid than near head.

In Praemancalla lag. it is also flat & straight but is much shorter & about the same breadth throughout.

In Mancalla this surface is slightly twisted at the part nearest the head from slight entering. There is less variation in breadth than in 37637 but somewhat more dif. in length & gr. br. as compared to Praemancalla. M. cedrosensis is generally broader than M. calif or M. diegensis (or milleri?)

	P. lag.	M. calif	M. dieg. 2310	M. milleri	M. cedrosensis
Glenoid facet length	12.4	10.2	9.25	9.3	7.2	8.8
" br.	6.1	5.6	4.8	4.8	4.0	4.4
Length from below scap. facet to head (ext.)	21.1	18.6	18.75	17.8	13.8	16.45
Ratio br to length	49.2%	55.0%	52.0%	51.6	56.6	50.6
Ratio length to distance scap. fac. to head	58.6	54.0	49.3	52.2	52.2	53.5
Ratio br to dist. scap. fac. to head	28.9	30.1	25.6	26.9	29.0	27.3

glenoid facet in 37637 large & flat. In Mancalla the facet is more convex In Praemancalla facet is slightly convex but is more clearly bounded than in Mancalla

CORACOID

Ratio br. humeral to br. fossa facet	57.2	71.4	70.0		78.9

6902

#37637 Caracol Praemancalla

		Praemancalla	M. calif.	M. dig.	M. mellii	M. cedrosi
Trionical canal						
Least depth below facet	4.0	4.9	3.5	3.5	3.2	4.3
gr. br.	5.9	5.9	5.8	5.9	4.55	5.8
ratio	68%	79.6	60.3	59.3	70.5	74.0

37637 resembles Mancalla in that the trio seal canal faces more posteriorly than internally. Prae. faces more nearly posteriorly than partly. The canal has a definite keel as in Mancalla. Praemancalla is more rounded in the area where the keel would be. The keel in 37637 is inset from the anterior edge somewhat as in M. calif. (bet. M. calif. & digueti in this char-

The fuscular facet overhangs the trio. canal with a deep depression below the facet and flares posteriorly more than in any Mancalla. (unduplicated in any other specimen at hand)

The head has a prominent point anteriorly as in M. digueti (M. calif. is more blunt) (this area broken in P. lag.)

		P. lag	M. calif	M. dig	M. mellii	M. cedrosi
gr. depth fusc. facet to head	7.7	7.2	6.45	5.6	5.0	6.0
Ratio this depth to br. trioz.	130	122	141.2	95.0	110	103
Br. fusc. facet	10.3	—	8.2	8.3	5.3	6.6

Crowned

Dec. 19, 1934
Coracoid

Chaw's
Coracoid 37437 from Loc. 6902 ~~resembles Praemancalla~~
~~as contrasted with Mancalla in having~~ more distinct & ventral flexure of
lag ~~the tricipital canal~~ ② Triosseal canal facing ~~—~~ internally
rather than posteriorinternally, ~~resulting in a plate like lateral flange or~~
~~internal fossa as viewed proximally~~
lag ~~③ Coracoid apophysis~~ Posterior portion of
+ reads: + overhanging tric. canal ~~with deep excavation~~ triceular facet markedly prohoder
lag ④ Coraco humeral surface broad + flat
~~⑤ Head + shaft~~
Note ① Upper end acutely flexed internally
⑤ Head with post. surface of shaft throughout. process extends
more inf. than post, + is near int. edge of shaft with shaft ~~in~~ close below humeral facet most from ant. edge
⑥ Shaft with sharp ridge
Miguel resembles P. lag. in ## 1, 2, 3
" Mancalla in # 6
④ the coraco humeral surface is flat as in Prae. but longer
than in lag. The surface is ~~—~~ still narrow + more
fluted (cavity faced) in Mancalla

Coracoid

Coracoid 6902 / 37637 Compared to Manualla & Praemanualla

		Manualla adult	Praemanualla
Coracohumeral surface	flat, long Broader int. gr. br. & length gr. 6.4 × 10.8 59.3% least br. & gr. br. 4.1 >64% least br. & length 38%	twisted, long 34 × 9.3 narrow gr. br. 4.7 gr. length 50.5% least br. 36.8	flat, short 5.1 × 8.2 4.65 Broad 62.2% gr. br. & length least br. & gr. br. 91% least br. & length 56.6%
Scapular facet	5.5 × 4.9 very deep	4.7 × 2.9 shallower	5.7 × 5.0 deep
Shaft breadth	6.7	5.3 – 6.2	6.3
Shaft below head int'ly	Strongly keeled	strongly keeled	more broadly rounded
Development of furcular facet postly	deep abrupt overhang	less deep + less abrupt	abrupt + deep
Fossa canal	facing slightly int to post.	facing almost directly post'ly	facing more int'ly than post'ly

Coracoid

Coracoid No. 37637 from Lac Mire 6902

Similar to coracoid of Praemancalla lagunensis in

① 5.6 × 4.5 scapular facet Pr. 6 × 5, mancalla dieg. 5 × 3.7, M. calif 3.8 × 3.8
:: 4.1 × 3.1

② br. lateral proc. facet 5.8 × 4.2 (62.4%) Pr., 6.8 × 4.7 (78 × 66) M. dieg. 5.8 × 3.3 (60.2%) M. calif. 5.9 × 4.1 (69.5%)
6.4 × 4.0 (61.6%)

③ Very large overhang of furcular facet with wide canal in trios. canal area

④ Broad ~~area~~ coracohumeral surface least 4.1, gr. 6.2 90° 66.9%
Praemancalla :: 4.7 :: 6.3 90° 74.5
Manc. dieg. :: 3.5 :: 4.7 90° 74.5
M. calif :: 3.4 :: 5.0 90° 68.0

⑤ Glenoid facet 6 × 9.5 (63.3% Pr. 5.6 × 9.2 (60.8%) M. dieg. 4.9 × 8.9 (90° 55.6)
M. calif. 4.8 × 8.8 (90° 52.7) :: :: 4.7 × 9.0 (90° 52.7)

The greatest dif. from P. lagunensis appears to be that the trios. area is more slanted + the ridge more prominent. With the proximal portion in P. lag. from 1945 homeum, that area is not too clear

Gr. br. coracohumeral surface rel. to br. glenoid facet,

	coraco	glen.	length coraco to length glenoid
37637	6.0 / 6.0	11.0	11.2
P. lag.	5.7 / 5.9	8.1	8.9
M. dieg	4.6 / 4.7	9.2	8.8
M. calif.	4.9 / 4.5		
M. cedros.	4.8 / 5.7	7.4	8.7
M. millerí	5.7 / 5.7	7.2	7.0
M. cedros	4.8 / 6.1		

Coracoid

12 4 4 / 19 4

(Rosarito Beach Sur, Baja Calif., Mod. Mio. dist. of Ulva Butcher Bay Shaktoh Harmon Pedregal, Examined July 1974 HS but SH + Pyn. Libbey)

Right ?, Radius 53907 from 6902 (calls by Paul Kuhnert)

gr. cent	36.5	least width 34.2	Pinguis
gr. dist	35.8	least width 33.9	(6902)
"	27.5	26.6	Mau. cedrosensis
"	29.4	27.8	M. diegensis
"	37.7	35.9	65121 (long)
br. dist	5.7	br. prox 4.9	(6902
	6.4	5.6	Pinguis
	4.9	4.0	M. cedrosensis
	5.5	3.9	M. diegensis
	5.4	4.7	65121

br. ulna 7.5 (6906)
6.4 M. cedrosensis

gr. dept sh	5.8	6902
	6.1	Pinguis
	5.5	M. cedros
	6.3	M. diegensis
	5.6	65121
br. shaft	2.8	6902
	2.7	Pinguis
	2.8	M. cedros
	2.4	M. diegensis
	2.8	65121

Ratio br/depth sh	48.4%	6902
	44.4	Pinguis
	51.0	cedros
	38.1	diegensis
	49.5	65121

Ratio depth gr/br length	16.2	6902 - 7.8
	10.8	Pinguis - 4.7
	19.2	Cedros - 10.1
	21.2	diegensis - 8.1
	15.0	65121 - 7.4

Least dept sh	x 5.2	6902
	x 5.0	Pinguis
	x 4.4	Cedros
	x 4.6	diegensis
	4.2	65121

Ratio least x sh. depth-sh	90.5	6902
	80.0	cedros
	73.0	diegensis
	24.5	65121
	83.5	Pinguis

Radius from 6902 differs from Macalla-
dist end more deeply excavated or concave
less stepped laterally, more at ≥ length of shaft
sides, Much less prominent crest
along convex edge. Concave edge distally
Prox. facet rectangular; Macalla ptd
rounded or oval

Radius from 65121 is also long
with less prom crest, but crest is
at least rel. more devel (rel. to least
br.) In other words the least br. is
less in 65121 than in 6902,
Dist end in 65121 excav as in 6902
but lacks strong prox. or ptd. side

Ratio br dist / gr length	15.9%	(6902)	per tooth 86%
	17.8	(cedros)	81.7
	18.5	(diegensis)	71.0
	11.7	(65121)	87.0
	11.8	(Pinguis)	

Ratio br prox / gr length	13.7	(6902)
	13.5	Cedros
	14.5	diegensis
	9.9	Pinguis

Radius

laterally compressed as in Maucalla

Right Radius #3907 from 6902 broader, less curved than Maucalla

concave side of shaft. Distal end more expanded

Bi a one distal [illegible] less than 3.0 — 3.0 — 33.8 least circ. of radius ± [illegible]

2.3 3.7 — 28.2 m. calcif

2.2 3.5 — 24.2 m. millar?

2.8 4.7 — 36.0 Loc. 65/121

2.4 3.3 — 28.3 M. digueti 24886 3.9 4.9

Surface (concave side) of shaft above distal end depressed

2.7 5.4 — 34.4 — Pinguinus

plane in Maucalla.

than Maucalla

Because of lachrymal marked

Bone appears less [illegible]

crest on convex edge

1

as in Maucalla

laterally compressed but less [illegible] than in Maucalla

[illegible] concave [illegible]

Shaft broad in especially expanded

distal articulation with depressed

Distal end, area that articulates

Ulnar depression broader & more depressed than in Maucalla, Convex contains lackey prominent projection of Maucalla

---

A single right radius #3907 from loc. 6902 is short and laterally compressed. However, it is less bladelike than any specimen of Maucalla & lacks the prominent crest on the palmar convex surface contains

The ulnar depression is broader & more depressed than in Maucalla.

		M. calcd.	M. digueti 24886	29.12	M. celer 27,-
a	Shaft length	33.5 mm	28.2 —	28.3	30.8
b	Shaft breadth	3.0	2.3	2.4	2.4 2.8
c	gr. depths	5.8	6.3	6.5	3.2? 5.5
d	breadth ulnar depression	5.0	3.7	3.9	3.9 3.9
	Ratio d/a	14.9%	13.1	13.8	12.9 14.4

RADIUS

The cardonocaracoids # 52216 from ter 3185

resemble the paratype of Praemancalla lagunensis as distinguished from Mancalla

in ① Presence of keel from process pentagon
② narrower glenoid facet

14.4	x 9.5	Mancalla length Process M1		145.5
15.3	x 10.5	" cedus.		145.0
17.1	x 11.5	" calif		157.0
13.3	11.0	" "		131.0
15.7	x 12	52216	br. width M 1 = 28% br. trochl 5.4	140
13.0	x 11.7	paratype Prae. lag	35.7 5.1	96.7
12.8	x 14.1	Pinguis		
13.9	x ?,	assgnd P. lag.	31.0 4.9	

Distinguished from P. lag in longer proc M1 with at least half below fur symphysis

The coracoid from 6902 # 37637

has the internal ends of the tricoracal a narrower crest as in Mancalla. Praemancalla is not rounded but less. Rel br. below processus to lit th head fistly. Crest visible from ant. edge of coracoid.

dipt	br.	c		ab	bc
5.2	7.1	x 21,	M 37637	73.3	
4.9	5.4	x 16.8	M. cedus	90.5	
5.0	6.1	x 17.7	P. lag	83.6	
4.6	6.35	x 19.0	M calif	92.3	
5.1	5.9	x 17.4	M. dieg	86.4	

Tricoracal canal elegiey abruptly posteriorad as in Mancalla; in Praeman lag. faces more internally.

Coraco-humeral surface broader & less anteriorly flexed than in Mancalla. Breadth at greatest pt. equalled in P. lag. but in lag. the surface is much shorter relative to breadth. Surface flatter than in P. lag.

11.1	x 6.3	M 37637	56.6%
8.6	x 6.3	in P. lag.	73.3
7.7	x 4.4	M dieg.	57.1
9.3	x 4.7	" calif	50.5
8.0	x 4.7	" cedus	58.8

Head projects anteriorly from canal with lip (actually a hook) (not like cedrus or P. lag.

Glenoid facet a little deeper cup

Measurements
Humerus

~~Length~~	P. wetmorei	P. lagunensis	Mancalla diegense diegense	Mancalla diegense cedrosensis	cedrosen calf.
Length	83.8mm.	.....	85.2 - 71.0	80.0-69.5	.....
Br. prox.	22.1-21.6	.....	20.3 - 17.3	20.1 - 17.0	19.4
Br. dist.	8.5	7.8			
Depth shaft above ectepi-condylar process	9.5	7.7			
Length deltoid cresttohead	47.5	.....			
height ectepi-condylar proc-ess above distal end.	17.0	15.3			
Ratio depth of shaft to breadth distal end	111.8%	98.7%			....
Breadth shaft above ectepicon dy,ar process					
Depth shaft through deltoid crest(gr.)					

All elements are larger than any previously described species of either Mancalla or Praemancalla. Qualitative distinctions from Mancalla are evident as follows: In the humerus the deltoid crest is shorter and less prominently protruded from the shaft at its distal termination, the head is less extended over the capital groove, the distal end is less compressed, the area above the condyles smooth and lacking the papilla above the external condyle. The ulna, though compressed, has a prominent olecranon. The upper end of the coracoid is more acutely flexed internally, the furcular facet protruding prominently and overhanging the triosseal canal, The radius lacks the prominent crest on the convex contour and the ulnar depression is deeper. The carpometacarpus bears a distinct pisiform process.

For 6906 N d Praemaucalla lagunensis

Humerus 42653 nearly complete
" 32432 prox end

Praemaucalla was described from a distal end of humerus (holotype 15288)

Chars. as follows: * ① ectepi. proc. separated at its base from ext. condyle
in distinction from maucalla

② dist. end less compressed

③ Tricipital groove less incised + tricip crest less prominent

④ intr. tricipital crest less distally extended + tending medad

* ⑤ palmar surface imp. trach. aut. less impressed + drag from ectepi. proc. + pt slightly prox, + attach. aut. lip

* ⑥ area but impression + ext. condyle smooth, lacking papilla at + p of ext. cond found in Maucalla

⑦ shaft rounded, Br. 66% of depth

Br + depth shaft
4.6 x 9.0 type. calif. 51.2%
4.8 x 10.3 M. calif. 46.6%
3.1 x 7.7 Praem. 66.9%
4.1-5.2 x 8.2-10.5 Maucalla-dig 47.7-51.1%

#42653
5.1 x 9.6 = 33.1%

Humerus 42653 agrees in #1, 5 + and 6.
As for #3 + 4 the area is broken
#7 the shaft is certainly less of a keel (palmad) than M. calif. but is deeper than in type of Praemaucalla (P. depth 7.7; 42653, 9.6

Another char. shared with Praemaucalla is broad smooth surface of ext condyle distally. the condyle becomes a keel at the level of the distal surface of the ext condyle in Maucalla

One for prox end of 42653
and 32432

Humerus

Prox. end humerus 4 2 6 53 Which is probably

Praemancalla,

(#2470)

Br. prox 22,1 agr. br M. degiusi 20,3 tho the specimen is T
This breadth is longer than 4 2 6 53 (M. calif 19,3)

Length to dist. surface
art. cartyl 83.8

M. degiusi 85,0 mm. (M. calif

Most notable distinction from Mancalla (all species)
is seen in palmar aspect; the ~~int~~ int. contour
of the head above the
rounded & the projecting the head inward T
↑ something. form as nevertheless than in Mancalla.
In Mancalla the projection of the head forms an acute
angle with the int. shaft, while the bone below it T extends inward
almost at the int. angle; the medial T bicipital contour
of Praemancalla (both 4 2 6 53 T 32 4 32) the angle
is obtuse T more of a broad curve than an angle.

Compared to Uria, Cepphus, T even Pinguinus
(1) In these genera the proximal edge of the lig. furrow forms
a ridge from head to medial crest T the head
does not project over the furrow.

Anomalously the depression below the head continues
diagonally down the shaft below the pneumatic
fossa with

Humerus

42653 distinguished from type P. lag. Humer

br sh	4.9	type 5.1
depth	9.6	" 7.7
ht ext ridge	7.0	" 5.0
br. cond.	8.5	" 7.8
depth bare ~~shaft~~ bath. mulp		" 6.3
br shaft	8.2	
ht ext ridge & sup	5.5	" 5.35

Space between ext. condyle + base of ectepicon. greater than in Marcella but not as wide as in lag.

Radial area more protruded palmad at prox. end than in lag more as in Marcella, slopes away more abruptly than in Marcella but less so than lag.

The scars on ext + ~~int~~ sides of dist end are more marked or a level in ~~#~~42653 than lag

The ext sup. slopes away very abruptly in lag, so that ext ~~facet~~ although is approx twice as far from ~~external~~ edge of shaft as is the ~~int~~ to the int. calc. ridge 4.4 + 5.7 in 42653

Humerus

Praemaucalla wetmorei

Humerus

Distinguished from P. laf.:

shaft above ectepicond. process deeper rel. to br.

		br. dist.	shaft depth at ect.	shaft depth at dist. end
5.2 × 7.8	P. laf. = 66.7%	7.8	10.5	66.7
5.0 × 9.6	wet. = 52.1	8.5	11.3	58.8

External side of shaft anconal to ectepicondylean process nearly flat (less sloping). Palmar surface through brachial depression also less flat in P. laf., slopes & flares distals on int. side from ext. fronto-pital ridge to edge of ext condyle rel. to depth shaft through ectepi.; greater in wet.

5.85 × 9.5	laf.	= 61.5%
7.3 × 9.8	wet	= 74.5%
4.6 × 9.7	Mauc. ced.	68.2
4.3 × 9.2	" dieg	68.5
~~6.6 × 9.9~~	~~nan~~	~~72.9~~
8.4 × 10.7	" "	80.3
5.7 × 7.5	" "	76.0

~~6 × 12.6 40.3~~
~~5.9 11.1 49.5~~

Space between edge of base of ectepicond. process and ext condyle ~~at dis~~ narrower than in Maucalla, as ~~than~~ than in laf.

① Resembling Praemaucalla in distinction & Maucalla in distinct separation between external condyle & base of ectepicondylean process, but to a lesser degree.

② Compression of distal end ~~less marked~~ less compressed with area of brachial depression extending to int condyle and papilla at top of ext condyle absent. However the brachial area has less decided slope in wetmorei

Humerus

2045-Q Via Mariposa East
Laguna Hills, Calif. 92653
December 3, 1975

Mrs. Joan Horn,
Smithsonian Institution Press
National Museum of Natural History Romm 71
Smithsonian Institution
Washington, D.C. 20560

Dear Mrs. Horn:

I will be mailing the galley of my paper for the Wetmore Festschrift (A New Species of Flightless Auk from the Miocene of California (Alcidae: Mancallinae)) today or tomorrow.

Owing to the Christmas rush, I thought it a good idea to let you know in a letter, as well, of the corrections made. One error is really important --

Galley 92, second paragraph, end of paragraph: 2½ lines of the original manuscript are omitted. See manuscript page 8 (unless it has been retypes to fall on another page). After the semicolon the paragraph should read

> also, the trochlea extends higher above that process and the lateral surface of the internal crest of the trochlea is more broadly and less deeply depressed.

Of lesser importance are the following corrections:

- galley 90 -- my computer says 3000 ft = 914 meters
- galley 61 -- delete the s on the paragraph heading Description (s)
- galley 92 -- paragraph 2, near the end the e and t are transposed in metacarpal
- galley 92 -- Literature Cited -- under Howard 1970 there is a typo on the word Extinct.
- Galley 92 -- Literature Cited -- Lucas 1901, the scientific name is not italicized in the original publication title (I specifically noted this on my manuscript, but possibly the notation was not conveyed to the copy made at the Smithsonian)
- Table -- under Ulna proximal depth M. diegense the a after 9a should be a dagger to conform with the footnote as altered from my original copy.

On the whole the galley was beautiful -- not often one sees such clean copy!

Sincerely,

Hildegarde Howard

Hildegarde Howard

Galley 92 Lit. Cited Howard 1930 · Extinct misspelled
Lucas 1901 Sci name was Harlecgo
in orig - fix!

National Museum of Natural History · Smithsonian Institution

WASHINGTON, D.C. 20560 · TEL. 202-

25 November 1975

Check ms Galley 92 ¶ 2, last two lines
Page next to last ¶, last 3 lines (2 are omitted)
Galloway: also, the troubles ——————
——————

Retd
Dec 3, 1975
1st class

Dear Festschrift contributor,

Enclosed are galleys for your contribution to the Wetmore volume. This is the only proof you will receive. Please check very carefully for errors and return by 17 December 1975 . If galleys are not received by this date we will assume you have no corrections to make and will proceed accordingly. Return corrected galleys to Mrs. Joan Horn, Smithsonian Institution Press, National Museum of Natural History Room 71, Smithsonian Institution, Washington, D.C. 20560.

Authors will receive two free copies of the entire volume. Arrangements for separates will be made after the volume is completed and you will be contacted further concerning this at a later date.

Sincerely,

Storrs L. Olson
Associate Curator
Division of Birds

IMPORTANT: Proofs must be returned to Mrs. Horn, not to me. By the time you receive this I will be on my way to Brazil and I do not return until 20 February or so.

Table ulna prox depth M diegiim 9a (should read 9†)

galley 92 ¶ 2 next to last line metacarpal et transpose

Galley 90 3000 ft = 914 m ? (yun han 920)
in 91 delete s on ¶ deadin Description

Mancallinae ~~in distinction to~~ rather than the typical alcids.

The radius (LACM 53907), although short and laterally compressed as in Mancalla, is less bladelike and lacks the prominent crest on its convex contour. The ulnar depression is broader and deeper than in Mancalla. Neither the ulna nor the radius is known for Praemancalla lagunensis. Those ~~elements~~ assigned to P. wetmorei both show less modification towards a flipperlike wing than ~~those of~~ in Mancalla, and in this regard are in keeping with the character of the other elements known for Praemancalla.

The radius is 12 % longer than the maximum known for any species of Mancalla (see Table 1). Using the radius as a guide, and comparing the relative size of ulna to radius in the type of Mancalla cedrosensis (associated skeletal elements of one individual), it is suggested that the ulna of P. wetmorei attained a length of 36.5 mm.

Carpometacarpus LACM 52216 differs from ~~this element in~~ that of Mancalla and resembles Praemancalla in the presence of a distinct, blunt pisiform process, rounded anterior contour of shaft of metacarpal II and deep narrow groove between the internal and external crests of the trochlea proximally. It is distinguished from P. lagunensis ~~in~~ by the narrower shaft and the relatively longer process of metacarpal I, with more than half its length distal to the level of the metacarpal symphysis; also, the trochlea extends higher above ~~the~~ that process and the lateral surface of the internal crest of the trochlea is more broadly and less deeply depressed.

In coracoid LACM 37637 the furcular facet is broad and deep; it extends ~~anteriorly~~ ventrally well beyond the triosseal canal, is strongly

Dec. 29, 1974

A New Species of Flightless Auk from the Miocene of California

(Mancallinae: Alcidae)

Hildegarde Howard

Since Lucas (1901) described the first humerus of Mancalla, knowledge of the flightless mancalline alcids has increased to include nearly all skeletal elements and to involve five species and two genera.

The typical genus, Mancalla, is known from four species, M. californiensis Lucas (1901), M. diegense (Miller (1937), M. milleri Howard (1970), and M. cedrosensis Howard (1971), and is recorded from Humboldt County in northern California to Cedros Island, Mexico. The Humboldt County site, with a single humerus assigned to M. diegense (Howard, 1970) is believed by Kohl (1974) p. 217 to be Pleistocene in age. The other records are Middle to Late Pliocene. Praemancalla is known by the single species, P. lagunensis Howard (1966), described from a Late Miocene deposit in Leisure World, Laguna Hills, Orange County, California (Los Angeles County Museum of Natural History (LACM) locality no. 1945).

Recently three other Miocene sites about 5 miles south of LACM 1945, in Laguna Niguel, Orange County, have yielded mancalline bones. The associated avifaunas from these sites include the same families recorded at LACM loc. 1945 but are not identical in species representation. None of the species described as new from loc. 1945 have appeared in the Laguna Niguel localities. On the basis of associated marine mammals it is suggested that these sites may represent a slightly later subdivision of the Late Miocene than loc. 1945 (Barnes et al). The mancalline skeletal elements from Laguna Niguel include humerus and ulna from LACM loc. 6906, coracoid and radius

cont'd over p. 2

from LACM loc. 6902 and carpometacarpus from LACM loc. 3185. All of these elements have been previously described for Mancalla (Miller and Howard, 1949). Only the coracoid, humerus and carpometacarpus can be compared with Praemancalla.

All elements ~~are~~ suggest a generally larger form than ~~in~~ any previously described mancalline species. ~~Although one humerus of Mancalla diegense is longer, it is of lesser breadth~~. Qualitative characters are also apparent. Compared with Mancalla the humerus has a shorter, less prominently protruded deltoid crest and the head is less extended over the capital groove; the distal end is less compressed and the area above the condyles is smooth and lacks the papilla above the external condyle. The distal characters more closely resemble those of Praemancalla, though the shaft is more compressed than in P. lagunensis. The proximal end of humerus is not knwon for Praemancalla. The upper end of the coracoid is more acutely flexed internally than in Mancalla, the furcular facet protruding more prominently and overhanging the triosseal canal. Again there is closer similarity to Praemancalla, but with differences in the triosseal area ~~and the coracohumeral surface than in P. lagunensis.~~ The carpometacarpus clearly resembles Praemancalla in distinction to Mancalla in the presence of a distinct pisiform process. Although both ulna and radius are compressed as in Mancalla, the ulna differs from that genus in having a prominent olecranon, and the radius lacks the prominent crest on its convex contour and has a deeper ulnar depression. These elements are now known for Praemancalla.

Although resemblance is closer to Praemancalla than to Mancalla in these specimens, there are clear distinctions from P. lagunensis. Possibly a third genus is represented. But, at the present state of knowledge, it seems wiser to assign the specimens to the genus Praemancalla under a new species name.

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All elements are larger than in any previously described species of either Mancalla or Praemancalla. Qualitative characters are also apparent. Compared with Mancalla the humerus has a shorter, less prominently protruded deltoid crest, and the head is less extended over the capital groove; the distal end is less compressed, and the area above the condyles is smooth and lacking the papilla above the external condyle. The distal characters more closely resemble those of Praemancalla, though the shaft is more compressed than in P. lagunensis. The proximal end of humerus is not available for Praemancalla. The upper end of the coracoid is more acutely flexed internally than in Mancalla, the furcular facet protruding more prominently and overhanging the triosseal canal. Again there is closer similarity to Praemancalla, but with differences than in P. lagunensis in the triosseal area and coracohumeral surface. The carpometacarpus clearly resembles Praemancalla in distinction to Mancalla in the presence of a distinct pisiform process. Although both ulna and radius are compressed as in Mancalla, the ulna differs from that genus in having a prominent olecranon, and the radius lacks the prominent crest on its convex contour, and has a deeper ulnar depression. These elements are not known for Praemancalla.

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I take pleasure in naming the new species in honor of Dr. Alexander Wetmore who has done so much to further the science of palaeornithology and who has generously given advice and counsel to me throughout my years of study in this field.

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sent P. lagunensis becomes clear, however, from a study of the comparable elements. It is possible that a third genus is represented. But, at the present state of knowledge, it seems wiser to assign the specimens to the genus Praemancalla under a new species name.

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Praemancalla wetmorei n. sp.

Holotype: Humerus, LACM no. 42653, complete except for tricipital area of distal end.

Locality and Age: LACM Locality no. 6906

Paratype: Proximal end of ulna LACM no. 32427 from the type locality.

Diagnosis: Humerus with head at nearly a right angle to internal tuberosity and not markedly extended over capital groove; deltoid crest short and not protruding prominently from shaft at its distal termination; ectepicondylar prominence protruding prominently at its proximal tip and slightly lateral in position with respect to palmar surface of shaft; groove between external condyle and base of ectepicondylar process more constricted and less distal in extent than in P. lagunensis; depth of shaft immediately above distal end ~~12%~~ 11.9 to mm 5 slum 9.4 log. 5 measller greater than breadth of distal end. Ulna laterally compressed with short brachial impression partially palmad in position; olecranon blunt but protruding proximally above cotylae and distinctly set off from cotylae by lateral depression both externally and internally.

See ~~Addendum~~ p. 4 for 3

(4) Dec 28, 1974

Measurements of Type humerus: Length internally 83.8mm, proximal breadth 22.1 mm, distal breadth 8.5mm, depth shaft immediately above ectepicondylar prominence 9.5 mm, breadth shaft at same point 5.0 mm, height of ectepicondylar prominence above distal end 17.0mm. Ratio of depth of shaft to breadth of distal end 111.8 %, ratio breadth to depth of shaft 52.6%. Distance from head to distal end of deltoid crest 47.5mm. Ratio length deltoid crest to total humeral length 57.4%.

Measurements of Paratype ulna: Proximal depth through olecranon 11.4mm, breadth proximal cotylae 7.4mm, least breadth shaft 4.2mm, depth of shaft 6.2 mm. Ratio breadth to depth of shaft 67.7%, ratio proximal breadth to proximal depth 64.8%

Measurements of referred specimens: Coracoid, length from below scapular facet to head 20.8 mm (max. Maucalla dyeing = M. calf) P. lagunensis 18.5 mm); br. furcular facet 10 mm (max Maucalla 8.6) breadth below furcular facet 5.8; breadth shaft below processus 7.1 mm (P. lag. 6.2, Maucalla 5.2 - 6.5 ca.). Radius, greatest length 35.8 (M caudm. 27.3 - 29.9; M. dig. 31.7 - 29.6, M. calf. 29.7); depth shaft 5.85, br. dist. end. 5.8. Ratio depth shaft & length 16.3% (19.8 - 23.9% in Maucalla)

Carpometacarpus: length process M1, 15.75; depth process through process M1, 12.1 mm, ratio br to depth shaft 97.6 (P. lag. 100%; Maucalla 69.7 - 84.5%)

Referred material: Proximal end of humerus LACM 32432 from type locality, tentatively referred; upper end of coracoid LACM 37637 and complete radius LACM 53907 from LACM Loc. 6902; proximal 3/4 of carpometacarpus LACM 52216 from LACM Loc. 3185.

Description of referred material: Humerus 32432 matches in all details the proximal end of the type specimen.

Coracoid LACM 37636 resembles Praemancalla in acute internal flexure proximally, triosseal canal facing more internally than posterointernaly, and posterior portion of furcular facet markedly pruding and overhanging triosseal canal; The coracohumeral surface is flat as in Praemancalla and broad toward the head, but is longer than in P. lagunensis and narrows towards the glenoid facet. In posterior view the procoracoid extends more internally than posteriorly and is near the internal edge of the shaft, characters which seem distinctive for this specimen. The border of the triosseal canal forms a sharp, longitudinal ridge as in Mancalla, inset from the anterior edge, as in M. californiensis. This area is incomplete proximally in P. lagunensis, but the border of the triosseal canal is less acute, more rounded.

Radius LACM 53907 though short and laterally compressed as in Mancalla is less bladelike and lacks the prominent crest on the convex contour. The ulnar depression is broader and deeper than in Mancalla.

Carpometacarpus LACM 52216 has the long, straight process of metacarpal 1, small facet for alar digit 1 and flat trochlear area proximally narrowing posterodistally as in both mancalline genera. It differs from Mancalla and resembles Praemancalla in the presence of a distinct, blunt pisiform process, relaively short process of metacapral, and deep narrow groove between theinternal and external crests of the trochlea posteriorly. It differs from the type of P. lagunensis in relatively longer process of metacarpal 1, with more than half its length distal to the level of the

Dec. 22. 1974

A NEW SPECIES OF FLIGHTLESS AUK (MANCALLINAE: ALCIDAE) FROM THE MIOCENE OF CALIFORNIA

By Hildegarde Howard

Since Lucas (1901) described the first humerus of Mancalla, knowledge of the flightless mancalline alcids has increased to include nearly all skeletal elements and to involve five species and two genera.

The typical genus, Mancalla, with four species (M. californiensis Lucas (1901), M. diegense (Miller) (1937), M. milleri Howard (1970) and M. cedrosensis Howard (1971)), is recorded from Humboldt County in northern California to Cedros Island, Mexico. The Humboldt County site, with a single humerus assigned to M. diegense (Howard (1970)) is believed by Kohl (1974) to be Pleistocene in age. The other records are Middle to Late Pliocene. Praemancalla is known by the single species P. lagunensis Howard (1966), described from a Late Miocene deposit in Orange County, California (Los Angeles County Museum of Natural History (LACM) locality no. 1945).

Recently three other Miocene sites in Orange County have yeilded mancalline bones (Lacm locs. 6906, 6902 and 3185). * On the basis of associated marine mammals from these sites, it is suggested that they may represent a slightly later subdivision of the Late Miocene than Loc. 1945 (Barnes et al, ms). The mancalline skeletal elements found at these sites include coracoid, humerus, ulna, radius and carpometacarpus, all of which have been previously described for Mancalla (Miller and Howrd, 1949). Only the coracoid, humerus and carpometacarpus can be compared with Praemancalla.

Distinctions from all species of Mancalla are evident/ Each element shows less modification towards flightlessness. In this respect there is closer resemblance to Praemancalla. That they do not repre-

* insert yellow parent note

+ The avifauna also contains species not reported at Loc. 1945

last page

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depth proximal end to depth proximal end 64% (Mancalla 65.5-73.4%)

~~Radius, least length 33.5mm, greatest length 35.8~~

Measurements required material;

Radius, greatest length 35.8 (maximum Mancalla 29.6); breadth distal end 5.7 (Maximum Mancalla 4.9); ratio breadth distal end to length 15.9% (Mancalla 17-18%, Pinguinus 11.7)

Coracoid, breadth across furcular facet 10.1 mm (maximum Mancalla (M. diegense) 8.7 mm.); breadth below furcula facet 5.85 (P. lagunensis 6.0mm, maximum Mancalla 5.9 mm); elngth from below scapular facet to head 20.5 (P. lagunensis 18.5, maximum Mancalla 18.7 (M. californiensis)); ratio breadth below furcular facet to length from scapular facet to head 28.6% (P. lagunensis 32.4 %, Mancalla 31-35%); depth shaft below procoracoid 5.05; breadth same place 7.0 mm; breadth coracohumral surface 6.1 mm (P. lagunensis 5.35, Mancalla maximum 5.0 (M. cedrosensis; length coracohumeral surface to glenoid facet 10.2 (P. lagunensis8.0) ratio gr breadth to length coracohumeral surface 6.1 mm (P. lagunensis 5.35mm) ~~ratio br. coracohumeral surface to br below furcular facet~~

Carpometacarpus, length process of metacarpal 1, 15.7 mm.; depth proximal end through process M1, internally 12.0 mm; breadth proximal trochlea 5.45mm;

California to Cedros Island, Mexico. Praemancalla is known by the single species P. lagunensis Howard (1966), described from a Late Miocene deposit in Orange County, California, Los Angeles County Museum of Natural History (LACM) locality no. 1945.

Recently, three other Miocene sites in Orange County have yielded mancalline bones (LACM locs. 6906, 6902 and 3185). On the basis of associated marine mammals from these sites, it is suggested that they may represent a slightly later subdivision of the Late Miocene than Loc. 1945 (Barnes et al, ms). The mancalline skeletal elements found at these sites include coracoid, humerus, ulna radius and carpometacarpus, all of which have been previously described for Mancalla (Miller and Howard, 1949). Only the coracoid, humerus and carpometacarpus can be compared with Praemancalla.

Distinctions from all species of Mancalla are evident. Each

Description of referred material: Humerus 32432 matches in all details the proximal end of the type specimen.

Coracoid (LACM 37637) ~~lacks the sternal end and procoracoid.~~ ~~Trioseal canal facing more internally than posterointernally, posterior portion of furcular facet markedly protruding and overhanging trioseal canal;~~ Upper end acutely flexed internally, with triosseal canal facing more internally than posterointernally, posterior portion of furcular facet markedly protruding and overhanging triosseal canal; coracohumral humeral surface flat and broad toward head, narrowing towards glenoid facet; in posterior view procoracoid extending more internally than posteriorly and near internal edge of shaft; shaft with sharp, longitudinal ridge below furcular facet, inset from anterior edge.

Radius no. LACM 53907 short and laterally compressed but less bladelike than in Mancalla and lacking prominent crest on convex contour found in that ganus; ulnar depression broader and deeper than in Mancalla?

Carpometacarpus LACM no. 52216 with long, straight process of metacarpal I, small facet for alar digit 1 and ~~fixx~~ trochlear area

red ink = corrections on final copy by editor of Contributions

Final Carbon July 4, 1975

A New Species of Flightless Auk from the Miocene of California (Alcidae: Mancallinae)

Hildegarde Howard

ABSTRACT

Praemancalla wetmorei is described from the Late Miocene of Orange County, California, with humerus and ulna as holotype and paratype, and radius, carpometacarpus and coracoid referred. The species, although less ~~highly~~ specialized as a flightless diver than *Mancalla*, appears more advanced than *Praemancalla lagunensis*, which is believed to be derived from slightly older deposits.

geologically younger genus

Hildegarde Howard, Chief Curator Emeritus, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, California 90007.

INTRODUCTION

Since Lucas (1901) described the first humerus of Mancalla, knowledge of the flightless mancalline alcids (Mancallinae) has increased to include nearly all skeletal elements and to involve five species and two genera.

The ~~typical~~ type genus, Mancalla, is known from four species (M. californiensis Lucas (1901), M. diegense (Miller, 1937), M. milleri Howard (1970) and M. cedrosensis Howard (1971)) and is recorded from Humboldt County in northern California to Cedros Island, Mexico. The Humboldt County site, with a single humerus assigned to M. diegense (Howard, 1970), is believed by Kohl (1974:217) to be Pleistocene in age. The other records are Middle to Late Pliocene. Praemancalla is known from the single species, P. lagunensis Howard (1966), described from a Late Miocene deposit in Leisure World, Laguna Hills, Orange County, California.

Recently, three other Miocene sites in Orange County have yielded mancalline bones. These sites are in Laguna Niguel, Approximately 5km 3 miles south of the Laguna Hills locality. The specimens from these sites are in the collections of the Natural History Museum of Los Angeles County. The catalog and locality numbers are listed under Los Angeles County Museum (LACM).

The associated avifauna from these sites includes the same families recorded at the type locality for Praemancalla lagunensis (LACM Loc. 1945) but ~~is~~ the species represented are not identical, ~~in species~~

representation. None of the species described as new from locality 1945 have appeared in the Laguna Niguel localities. On the basis of associated marine mammals, it is suggested that these sites may represent a later subdivision of the Late Miocene than Local. 1945 (Barnes et al, in preparation).

The mancalline skeletal elements from Laguna Niguel include humerus, ulna, radius, carpometacarpus and coracoid, all of which have been previously described for Mancalla. Only the humerus, carpometacarpus, and coracoid can be compared with Praemancalla. The newly found specimens suggest a generally larger form than any previously described mancalline species. Qualitative characters show distinction from comparable elements of all species of Mancalla. Distinctions are also apparent with respect to Praemancalla lagunensis, but the degree of adaptation towards restriction of the wings for swimming is closer to Praemancalla than to Mancalla. Possibly a third genus is represented. At the present state of knowledge, however, it seems wiser to assign the specimens to the genus Praemancalla under a new species name.

I take pleasure in naming the new species in honor of Dr. Alexander Wetmore who has done so much to further the science of paleornithology, and who has generously given advice and counsel to me throughout my years of study in this field.

DESCRIPTION

In describing Praemancalla lagunensis, the specific diagnosis of holotype humerus and paratype carpometacarpus served also as

the generic diagnosis. In the specimens from Laguna Niguel now at hand, the following characters are in agreement with that diagnosis:

Humerus with groove separating base of ectepicondyle from external condyle, brachial impression faint and running diagonally from ectepicondylar prominence to a point slightly proximal to attachment of articular ligament, with no papilla present above condyles. The tricipital grooves and ridges are broken in the humerus from Laguna Niguel, so the characters of this area set forth in the original diagnosis cannot be assessed.

Carpometacarpus with distinct, blunt pisiform process, trochlear area having narrow, deep groove between internal and external crests posteriorly, metacarpal 2 relatively broad with more rounded anterior contour and more angular internal contour than in Mancalla, and process of metacarpal I relatively short.

The following additional characters observed in the specimens now at hand are considered to be of generic value ~~in distinction from~~ when compared with Mancalla: Humerus with head only slightly extended over capital groove, deltoid crest weakly developed, area of anterior articular ligament slightly ~~swelled~~ swollen; Ulna with prominent olecranon process; radius lacking prominent crest on convex contour; Coracoid with scapular facet facing dorsally posteriorly, coracohumeral attachment flat and angular in outline.

Praemancalla wetmorei new species

HOLOTYPE.-- Humerus LACM 42653, complete except for tricipital area of distal end (Plate 1, i,j).

TYPE LOCALITY.-- LACM Loc. 6906, site of excavation for North American Rockwell building (now U.S. General Services Administration building) on El Lazo Road, Laguna Niguel, Orange County, California; 3000 feet north of junction of Aliso Creek and Sulfur Creek, in yellow sands and laminated gray shale. Latitude 33°33'43" North, longitude 117°42'44" West. In the NE¼ NE¼, SE¼ of unsurveyed Sec. 16, T.7S., R.8W., San Juan Capistrano quadrangle, USGS 1948, 1:24000.

FORMATION AND AGE.-- Monterey Formation, Late Miocene.

PARATYPE.-- Proximal end of ulna LACM 32429 from type-locality (Plate 1, e).

DIAGNOSIS.-- Humerus proximally broad; medial profile of capital groove a wide open curve; depth through deltoid crest only 5% greater than depth of shaft above distal end; ectepicondylar prominence notably protuberant at its proximal tip and slightly lateral in position with respect to palmar surface of shaft; groove between external condyle and base of ectepicondyle more constricted and less distal in extent than in P. lagunensis; shaft breadth above ectepicondylar prominence 53% of shaft depth at same point; shaft depth 113% of breadth of distal end.

Ulna laterally compressed, with short brachial impression partially palmad in position and bordered palmad with heavy ridge; olecranon blunt but protruding proximally beyond cotylae and distinctly set off from cotylae by lateral depression both externally and internally.

MEASUREMENTS.-- Humerus; length to external condyle 82.7 mm, greatest proximal breadth from pectoral to bicipital crests 22.2 mm, breadth across head 19.6 mm, breadth through distal condyles 8.5 mm, breadth and depth of shaft above ectepicondylar prominence 5.1 mm and 9.6 mm respectively, height of ectepicondylar prominence above distal end 16.9 mm, greatest depth through deltoid crest 10.1 mm, breadth of shaft at same point 5.5 mm. Ulna; proximal breadth across cotylae 7.5 mm, proximal depth through olecranon 11.3 mm, breadth and depth at middle of shaft 4.2mm and 6.2 mm respectively.

REFERRED MATERIAL.-- From Laguna Niguel, Orange County, California, Late Miocene, Monterey Formation. Proximal end of humerus LACM 32432 (Plate 1, k) from type-locality (LACM loc. 6906). Complete radius LACM 53907 (Plate 1, g) and ~~upper~~ scapular end of coracoid (Plate 1, a, b) LACM 37637 from LACM locality 6902 at northwest end of El Lazo R oad, ~~1200 feet~~ 365 m northwest of type-locality and ~~800 feet~~ 244 m east of Aliso Creek, in basal ~~2-4~~ 1.5-1.5 feet of coarse yellow sand directly overlying laminated gray shale. Proximal 3/4 of carpometacarpus LACM 52216 (Plate 1, f) from LACM locality 3185, in tributary gully west of Aliso Creek in coarse yellow sand.

CHARACTERISTICS

~~DESCRIPTION~~.-- Compared with Mancalla, the humerus of P. wetmorei is relatively, as well as actually, broader both proximally and distally (ratio of greatest proximal breadth to length 26.8% in P. wetmorei, 23%-25% in Mancalla; ratio of distal breadth to length 10.2% in P. wetmorei, 8.2% - 9.6% in Mancalla) and exceeds in length all but one specimen of Mancalla (the maximum of M. diegense). It is, however, 8% longer than the average for M.

diegense and 12% longer than the average for M. cedrosensis (see Table 1), and 32% longer than the much smaller M. milleri.

The lesser protrusion of the head over the capital groove is reflected in the wide, open curve between the head and internal tuberosity as seen in palmar and anconal views; this condition contrasts with the narrow, U-shaped curve found in Mancalla (see Plate 1, h - 1). Further distinction from Mancalla is seen in the deltoid crest which, in P. wetmorei, describes a low, even arc and is not expanded towards its distal termination. Distally, the greater breadth of the humerus is observed not only in the width through the condyles but also in a slight expansion in the region of the attachment of the anterior ligament. In this character, as well as in the lateral slant of the brachial impression and absence of a prominent papilla above the condyles, P. wetmorei resembles Praemancalla lagunensis. It is distinguished from that species in greater projection of the ectepicondylar prominence from the shaft, narrower groove between the base of the ectepicondyle and the external condyle, and relatively narrower and deeper shaft (relative breadth to depth of shaft 53% in P. wetmorei, 66% in P. lagunensis). In depth of shaft relative to breadth of distal end, P. wetmorei is intermediate between Praemancalla lagunensis and the several species of Mancalla (113% in P. wetmorei, 99% in P. lagunensis, 126-140% in Mancalla).

The prominence of the olecranon immediately distinguishes the ulna of P. wetmorei from all species of Mancalla, but the palmad position of the brachial impression and the shortened lip of the external cotyla assign the element to the subfamily Mancallinae

DESCRIPTION.-- Compared with Mancalla, the humerus of P. wetmorei is actually as well as relatively broader both proximally and distally (ratio of greatest proximal breadth to length 26.8%; 23%-25% in Mancalla; ratio of distal breadth to length 10.2%; 8.0%-8.2% in Mancalla) and exceeds in length all but one specimen (of M. diegense). It is, however, 8% longer than the average for M. diegense and 12% longer than the average for M. cedrosensis. (see Table I).

The lesser protrusion of the head over the capital groove is reflected in the wide open curve between head and internal tuberosity as seen in palmar profile; this condition contrasts with the narrow, U-shaped curve found in Mancalla. Further distinction from Mancalla is seen in the deltoid crest which, in P. wetmorei, describes a low, even arc and is not expanded towards its distal termination. Distally, the greater breadth of the humerus is observed not only in the breadth through the condyles but also in a slight expansion in the region of the attachment of the anterior ligament. In this character, as well as the lateral slant of the brachial impression and absence of a prominent papilla above the condyles, P. wetmorei resembles Praemancalla lagunensis, but is distinguished from that species in the narrower groove between the base of the ectepicondyle and the external condyle, and is further distinguished by the relatively narrower and deeper shaft (relative breadth to depth of shaft 52% in P. wetmorei, 66% in P. lagunensis) depth of shaft relative to breadth of distal end (113% in P. wetmorei, 99% in P. lagunensis, 126-140% in Mancalla).

The prominence of the olecranon immediately distinguishes the ulna of P. wetmorei from all species of Mancalla, but the palmad position of the brachial impression and the shortened lip of the external cotyla assign the element to the subfamily Mancallinae in distinction to the typical alcids.

The radius (Raeum 539079), though short and laterally compressed as in Mancalla, is less bladelike and lacks the prominent crest on its convex contour. The ulnar depression is broader and deeper than in Mancalla. Neither the ulna nor radius is known for Praemancalla ~~lagunensis~~. These elements assigned to P. wetmorei both show less modification towards a flipper-like wing than in Mancalla, and In this regard they are in keeping with the character of the ~~other~~ elements known for ~~assigned to~~ Praemancalla.

The radius is 12% longer than the maximum known for any species of Mancalla (see Table I). Using the radius as a guide, and comparing the relative size of ulna to radius in the type of Mancalla cedrosensis (associated skeletal elements of one individual) it is suggested that the ulna of P. wetmorei attained a length of 36.5 mm.

Carpometacarpus

Carpometacarpus LACM 52216 has the long, straight process of metacarpal 1, small facet for alar digit 1 and flat trochlear area proximally, narrowing posterodistally, ~~as in~~ characteristics both mancalline genera. It differs from Mancalla and resembles Praemancalla in the presence of a distinct, blunt pisiform process, rounded anterior contour of shaft of M2 and deep narrow groove between the internal and external crests of the trochlae posteriorly. It ~~differs~~ distinguished from ~~the type of~~ P. lagunensis in relatively longer process of M1, with more than half its length distal to the level of the metacarpal symphysis, and trochlea extending higher above the process with lateral surface of internal trochlea more broadly, less deeply depressed.

Measurements of referred material: Radius, greatest length 35.8; least length 33.6; greatest depth of shaft 5.8; breadth at middle of shaft 3.0; breadth axross distal end 5.8.

Coracoid: Distance from below scapular facet to head 20.8; breadth furcular facet 10.0; least breadth below furcular facet 4.0; breadth across triosseal canal 5.8; breadth shaft below procoracoid 7.1; greatest breadth coraco-humeral attachment 5.5; least breadth of same 4.2; length of coracodhumeral attachment 10.1

Carpometacarpus: Length of process of metacappal 1, 15.7; greatest depth of proximal end though trochlea and process of M1 12.1; greatest breadth of ttochlea 5.4; breadth of shadt of metacarpal 2 4.3, depth of shaft of metacarpal 2 4.3

In coracoid LACM 37637, referred to P. wetmorei, the furcular facet is broad and deep; it extends anteriorly well beyond the triosseal canal, is strongly thrust mediad above the canal, and is markedly undercut. Below the facet the bone narrows and the anterior border of the triosseal canal is sharply angular. Mancalla varies in development of the furcular facet, with greatest overhang in M. cedrosensis, least in M. californiensis; but in none is it as anteriorly extended as in P. wetmorei. The facet is broken anteriorly in the single coracoid of Praemancalla, but that which remains is deep and has a strong overhang. Below the facet, however, resemblance is closer to Mancalla than to Praemancalla; the area is broader and more rounded in the latter. In direct posterior view (with posterior surface of shaft held horizontally) the scapular facet in P. wetmorei is more posteriorly, less laterally, directed than in Mancalla, and the triosseal canal faces more mediad. Resemblance is closer to Praemancalla lagunensis, although the canal is more medially directed in the latter species. The attachment of the coracohumeral muscle in P. wetmorei is broad, flat and angular in outline at its upper end, as in P. lagunensis, but is relatively longer and narrows near the glenoid facet. In Mancalla the attachment is narrow and rounded.

SUMMARY AND CONCLUSIONS

Four wing elements and a coracoid from three correlative localities of Late Miocene age in Laguna Niguel, Orange County, California, represent the alcid subfamily Mancallinae. The degree of specialization towards a flipperlike wing is less than in the Pliocene genus Mancalla, and reflects a stage of development closer to the Miocene genus Praemancalla. Differences noted with respect to Praemancalla lagunensis, however, suggest a slight advance towards the swimming adaptation. The humerus is more compressed, the triosseal canal of the coracoid more posteriorly rotated and narrower, the process of metacarpal 1 of the carpometacarpus longer.

The suggestion of an evolutionary trend is in keeping with the evidence presented by the associated faunas of the localities involved, which indicates a slightly greater age for the type locality of P. lagunensis (LACM Loc. 1945) than for the Laguna Niguel sites.

The new species, Preamancalla wetmorei is described.

ACKNOWLEDGMENTS.-- I am grateful to the Vertebrate Paleontology Section of the Natural History Museum of Los Angeles County for placing the Museum's collections at my disposal and for the many courtesies of the staff members. I particularly appreciate the assistance of Dr. Lawrence Barnes in discussion of matters pertaining to the field work in Orange County.

The photographs were made by Lawrence Reynolds, Museum Photographer.

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Miller, Loye

1937. An Extinct Puffin from the Pliocene of San Diego, California. Transactions of the San Diego Society of Natural History, 8(29):375-378, 2 figures.

Scientific name not italized in this title. →

thrust mediad above the canal, and is markedly undercut. Below the facet the bone narrows and the ventral border of the triosseal canal is sharply angular. The species of Mancalla vary in development of the furcular facet and bordering of the triosseal canal. The greatest overhang of the facet, and the least angular border of the triosseal canal are found in M. cedrosensis; the least overhang, and most angular border of the canal occur in M. californiensis. In no specimen of Mancalla is the furcular facet as ventrally extended as in P. wetmorei. This facet is broken ventrally in the single coracoid of Praemancalla lagunensis, but the portion that remains is deep and has a strong overhang; below the facet, however, the area is broader and more rounded than in P. wetmorei. In direct dorsal view (with dorsal surface of shaft held horizontally) the scapular facet in P. wetmorei is more dorsally and less laterally directed than in Mancalla, and the triosseal canal faces more mediad. Resemblance is closer to Praemancalla lagunensis although the canal is even more medially directed in the latter species. The attachment of the coracohumeral muscle in P. wetmorei is broad, flat and angular in outline at its anterior end, as in P. lagunensis, but is relatively longer, and narrows near the glenoid facet. In Mancalla the attachment is narrow and rounded.

SUMMARY AND CONCLUSIONS

Four wing elements and a coracoid from three correlative localities of Late Miocene age in Laguna Niguel, Orange County, California, represent a new species, Praemancalla wetmorei, in the alcid subfamily Mancallinae. The degree of specialization towards a flipperlike wing is less

than in the Pliocene genus Mancalla, and reflects a stage of development closer to the Miocene genus Praemancalla. Differences noted with respect to Praemancalla lagunensis, however, suggest a slight advance towards the ~~swimming adaptation.~~ more specialized wing of Mancalla The humerus is more compressed, the triosseal canal of the coracoid more ~~posteriorly~~ dorsally rotated and narrower, the process of metacarpal 1 of the carpometacarpus longer.

This ~~suggestion of an~~ evidence evolutionary trend is in keeping with the evidence presented by the associated faunas of the localities involved, which indicates a slightly greater age for the type locality of P. lagunensis (~~LACM locality 1945~~) than for the Laguna Niguel sites.

~~The new species, Praemancalla wetmorei is described.~~

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Miller, Loye

1937. An Extinct Puffin from the Pliocene of San Diego, California. Transactions of the San Diego Society of Natural History, 8(29):375-378, 2 figures.

Legend for Plate 1

Plate 1.-- Skeletal elements of Praemancalla and Mancalla. a, b, P. wetmorei, coracoid 37637 internal and posterior views; c, P. lagunensis, coracoid 15289 posterior view; d, M. diegense, coracoid 2310 posterior view; e, f, g, P. wetmorei, ulna paratype 32429 internal view, carpometacarpus 52216 internal view, radius 53907 palmar view; h, M. cedrosensis, humerus 15367 palmar view; i, j, P. wetmorei, humerus holotype 42653 palmar and anconal views; k, P. wetmorei, humerus 32432 anconal view; l, M. diegense, humerus 2331, anconal view; Approximately natural size. Catalog numbers from LACM.

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TABLE 1.--Skeletal Measurements (in millimeters) of Praemancalla wetmorei Compared with P.lagunensis, Mancalla diegense, M. cedrosensis, M.californiensis

	Praemancalla		Mancalla						
			diegense			cedrosensis			californiensis*
	wetmorei	lagunensis	min.	mean	max.	min.	mean	max.	
Humerus									
Length	82.7	....	71.0	76.5	85.2	69.5	73.5	80.0	....
Greatest proximal breadth	22.2	....	17.3	18.7	20.3	17.0	17.9	20.1	19.4
Distal breadth	8.5	7.8	6.4	6.7	8.0	6.9	7.0	7.2	....
Ulna									
Proximal depth	11.3	....	9.0[a]		9.3	8.8	9.7	10.2	9.9
Proximal breadth	7.5	....	5.9	6.4	6.6	6.2	6.6	7.2	6.5
Radius									
Greatest length	35.8	....	29.6	30.9	31.8	27.3	29.3	31.1	29.7
Greatest shaft depth	5.8	....	6.3	6.35	6.4	5.4	5.6	6.1	6.8
Shaft breadth	3.0	....	2.3	2.5	2.7	2.5	2.6	2.8	2.3
Carpometacarpus									
Length process metacarpal 1	15.7	14.0	15.2	15.3	15.5	15.4	15.6	16.0	17.1
Proximal depth	12.1	11.9	9.7	10.3	11.0	10.2	10.5	11.1	11.2
Shaft breadth	4.3	4.5	3.1	3.4	3.7	3.4	3.5	3.8	3.4
Coracoid									
Length from below scapular facet to head	20.9	18.8	15.4	17.3	19.5	15.2[a]		16.7	18.8
Breadth below furcular facet	5.8	6.0	5.4	5.8	6.3	5.2	5.5	6.0	5.9
Breadth furcular facet	10.3	....	7.3	7.8	8.6	7.1[a]		7.3	8.7

*Only one specimen of each element of M. californiensis, except carpometacarpus (average of four).

[a]Only two specimens measurable for this dimension.

TABLE 1.-- Skeletal Measurements (in millimeters) of *Praemancalla wetmorei* compared with *P. lagunensis*, *Mancalla diegense*, *M. cedrosensis*, *M. californiensis*.

	Praemancalla		*Mancalla*						
	wetmorei	*lagunensis*	*diegense*			*cedrosensis*			*californiensis**
			min.	mean	max.	min.	mean	max.	
Humerus									
Length	82.7	....	71.0	76.5	85.2	69.5	73.5	80.0	....
Greatest proximal breadth	22.2	....	17.3	18.7	20.3	17.0	17.9	20.1	19.4
Distal breadth	8.5	7.8	6.4	6.7	8.0	6.9	7.0	7.2	....
Ulna									
Proximal depth	11.3	....	9.0[a]		9.3	8.8	9.7	10.2	9.9
Proximal breadth	7.5	....	5.9	6.4	6.6	6.2	6.6	7.2	6.5
Radius									
Greatest length	35.8	...	29.6	30.9	31.8	27.3	29.3	31.1	29.7
Greatest shaft depth	5.8	....	6.3	6.35	6.4	5.4	5.6	6.1	6.8
Shaft breadth	3.0	....	2.3	2.5	2.7	2.5	2.6	2.8	2.3
Carpometacarpus									
Length process Metacarpal I	15.7	14.0	15.2	15.3	15.5	15.4	15.6	16.0	17.1
Proximal depth	12.1	11.9	9.7	10.3	11.0	10.2	10.5	11.1	11.2
Shaft breadth	4.3	4.5	3.1	3.4	3.7	3.4	3.5	3.8	3.4
Coracoid									
Length from below scapular facet to head	20.9	18.8	15.4	17.3	19.5	15.2[a]		16.7	18.8
Breadth below furcular facet	5.8	6.0	5.4	5.8	6.3	5.2	5.5	6.0	5.9
Breadth furcular facet	10.3	....	7.3	7.8	8. 6	7.1[a]		7.3	8.7

* Only one specimen of each element of *M. californiensis*, except carpometacarpus (average of four).

[a] Only two specimens measurable for this dimension.

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National Museum of Natural History
SMITHSONIAN INSTITUTION • WASHINGTON, D.C. 20560

29 May 1975

Dear Dr. Howard,

Because I have had to rearrange certain papers in order to get the acknowledgments at the end of the introduction where our copy editors want them, I have had your paper retyped by our departmental MS typist. I have gone over it briefly and thought you might like to have a copy of the retyped version to check for possible errors, particularly in numbers, since I didn't check these very carefully. Let me know if you find any typos. No rush. I hope all is well with you.

As ever,

Card sent June 5
p. 1 tin?
p. 2 lapse with telephonic 4th line 3
p. 3 longitude (typo longitute)

A New Species of Flightless Auk from the Miocene of California (Alcidae: Mancallinae)

Hildegarde Howard

Abstract

Praemancalla wetmorei is described from the Late Miocene of Orange County, California, with humerus and ulna as holotype and paratype, and radius, carpometacarpus, and coracoid referred. The species, although less ~~highly~~ specialized as a flightless diver than the geologically younger genus *Mancalla*, appears to be more advanced than *Praemancalla lagunensis*, which is believed to be derived from slightly older deposits.

Hildegarde Howard, Chief Curator Emeritus, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, California 90007.

Introduction

Since Lucas (1901) described the first humerus of Mancalla, knowledge of the flightless mancalline alcids (Mancallinae) has increased to include nearly all skeletal elements and to involve five species and two genera.

The type-genus, Mancalla, is known from four species, M. californiensis Lucas (1901), M. diegense (Miller, 1937), M. milleri Howard (1970) and M. cedrosensis Howard (1971) and is recorded from Humboldt County in northern California to Cedros Island, Mexico. The Humboldt County site, with a single humerus assigned to M. diegense (Howard, 1970), is believed by Kohl (1974:217) to be Pleistocene in age. The other records are Middle to Late Pliocene. Praemancalla is known from the single species, P. lagunensis Howard (1966), described from a Late Miocene deposit in Leisure World, Laguna Hills, Orange County, California.

Recently, three other Miocene sites in Orange County have yielded mancalline bones. These sites are in Laguna Niguel, approximately 3 miles south of the Laguna Hills locality. The specimens from these sites are in the collections of the Natural History Museum of Los Angeles County. The catalog and locality numbers are listed under Los Angeles County Museum (LACM).

The associated avifauna from these sites includes the same families recorded at the type locality of Praemancalla lagunensis (LACM Loc. 1945) but the species represented are not identical. None of the species described as new from locality 1945 has appeared in the Laguna Niguel localities. On the basis of associated marine mammals, it is suggested that these sites may represent a later subdivision of the Late Miocene than Loc. 1945 (Barnes et al., in preparation).

The mancalline skeletal elements from Laguna Niguel include humerus, ulna, radius, carpometacarpus and coracoid, all of which have been previously described for Mancalla. Only for the carpometacarpus, coracoid, and distal end of the humerus is there comparable material of Praemancalla. The newly found specimens suggest a generally larger form than any previously described mancalline species. Qualitative characters show distinction from comparable elements of all species of Mancalla. Distinctions are also apparent with respect to Praemancalla lagunensis, but the degree of adaptation towards restriction of the wings for swimming is closer to Praemancalla than to Mancalla. Possibly a third genus is indicated. At the present state of knowledge, however, it seems wiser to assign the specimens to the genus Praemancalla under a new species name.

Acknowledgments.- I am grateful to the Earth Sciences Division of the Natural History Museum of Los Angeles County for placing the Museum's collections at my disposal and for the many courtesies of the staff members. I particularly appreciate the assistance of Dr. Lawrence Barnes in discussion of matters pertaining to the field work in Orange County. The photographs were taken by Lawrence Reynolds, Museum Photographer. Special thanks go to my husband, Henry Anson Wylde, for the art work in connection with the preparation of the plate.

Description

In describing Praemancalla lagunensis, the specific diagnosis of the holotype humerus and paratype carpometacarpus served also as the generic diagnosis. In the specimens from Laguna Niguel now at hand, the following characters are in agreement with that diagnosis:

Humerus with groove separating base of ectepicondyle from external condyle, brachial impression faint and running diagonally from ectepicondylar prominence to a point slightly proximal to the attachment of the articular ligament, with no papilla present above condyles. The tricipital grooves and ridges are broken in the humerus from Laguna Niguel, so the characters of this area set forth in the original diagnosis cannot be assessed.

Carpometacarpus with distinct, blunt pisiform process, trochlear area having narrow, deep groove between internal and external crests posteriorly, metacarpal 2 relatively broad with more rounded anterior contour and more angular internal contour than in Mancalla, and process of metacarpal I relatively shorter.

The following additional characters observed in the specimens now at hand are considered to be of generic value when compared with Mancalla: humerus with head only slightly extended over capital groove, deltoid crest weakly developed, area of anterior articular ligament slightly swollen; ulna with prominent olecranon process; radius lacking prominent crest on convex contour; coracoid with scapular facet facing dorsally, coracohumeral attachment flat and angular in outline.

Praemancalla wetmorei new species

Holotype.-- Humerus LACM 42653, complete except for tricipital area of distal end (Plate 1i,j).

Type locality.-- LACM Loc. 6906, site of excavation for North American Rockwell building (now U.S. General Services Administration building) on El Lazo Road, Laguna Niguel, Orange County, California; 3000 feet north of junction of Aliso Creek and Sulfur Creek, in yellow sands and laminated gray shale. Latitude 33°33'43" north, longitude 117°42'44" west. In the NE 1/4 NE 1/4 SE 1/4 of unsurveyed Sec 16, T7s, R8W, San Juan Capistrano quadrangle, USGS 1948, 1:24000.

Formation and Age.-- Monterey Formation, Late Miocene.

Paratype.-- Proximal end of ulna LACM 32429 from type-locality (Plate 1e).

Diagnosis.-- Humerus broad proximally; medial profile of capital groove a wide open curve; depth through deltoid crest only 5% greater than depth of shaft above distal end; ectepicondylar prominence notably protuberant at its proximal tip and slightly lateral in position with respect to palmar surface of shaft; groove between external condyle and base of ectepicondyle more constricted and less distal in extent than in P. lagunensis; shaft breadth above ectepicondylar prominence 53% of shaft depth at same point; shaft depth 113% of breadth of distal end.

Ulna laterally compressed, with short brachial impression partially palmad in position and bordered palmad by heavy ridge; olecranon blunt but protruding proximally beyond cotylae and distinctly set off from cotylae by lateral depression both externally and internally.

Measurements.-- Humerus: length to external condyle 82.7 mm, greatest proximal breadth from pectoral to bicipital crests 22.2 mm, breadth across head 19.6 mm, breadth through distal condyles 8.5 mm, breadth and depth of shaft above ectepicondylar prominence 5.1 mm and 9.6 mm respectively, height of ectepicondylar prominence above distal end 16.9 mm, greatest depth through deltoid crest 10.1 mm, breadth of shaft at same point 5.5 mm. Ulna: proximal breadth across cotylae 7.5 mm, proximal depth through olecranon 11.3 mm, breadth and depth at middle of shaft 4.2 mm and 6.2 mm respectively.

Referred Material.-- From Laguna Niguel, Orange County, California, Late Miocene, Monterey Formation. Proximal end of humerus LACM 32432 (Plate 1k) from type-locality (LACM Loc. 6906). Complete radius LACM 53907 (Plate 1g) and scapular end of coracoid (Plate 1a,b) LACM 37637 from LACM locality 6902 at northwest end of El Lazo Road, 1200 feet northwest of type-locality and 800 feet east of Aliso Creek, in basal 2-4 feet of coarse yellow sand directly overlying laminated gray shale. Proximal 3/4 of carpometacarpus LACM 52216 (Plate 1f) from LACM locality 3185, in tributary gully west of Aliso Creek in coarse yellow sand.

Etymology.-- I take pleasure in naming this new species in honor of Dr. Alexander Wetmore who has done so much to further the science of paleornithology, and who has generously given advice and counsel to me throughout my years of study in this field.

Characteristics.-- Compared with Mancalla, the humerus of P. wetmorei is relatively, as well as actually, broader both proximally and distally (ratio of greatest proximal breadth to length 26.8% in P. wetmorei, 23%-25% in Mancalla; ratio of distal breadth to length 10.2% in P. wetmorei,

8.2% - 9.6% in Mancalla) and exceeds in length all but one specimen of Mancalla (the maximum of M. diegense). It is, however, 8% longer than the average for M. diegense and 12% longer than the average for M. cedrosensis (see Table 1), and 32% longer than the much smaller M. milleri.

The lesser protrusion of the head over the capital groove is reflected in the wide, open curve between the head and internal tuberosity as seen in palmar and anconal views; this condition contrasts with the narrow, U-shaped curve found in Mancalla (see Plate 1h - 1l). Further distinction from Mancalla is seen in the deltoid crest which, in P. wetmorei, describes a low, even arc and is not expanded towards its distal termination. Distally, the greater breadth of the humerus is observed not only in the width through the condyles but also in a slight expansion in the region of the attachment of the anterior ligament. In this character, as well as in the lateral slant of the brachial impression and absence of a prominent papilla above the condyles, P. wetmorei resembles Praemancalla lagunensis. It is distinguished from that species in the greater projection of the ectepicondylar prominence from the shaft, narrower groove between the base of the ectepicondyle and external condyle, and relatively narrower and deeper shaft (relative breadth to depth of shaft 53% in P. wetmorei, 66% in P. lagunensis). In depth of shaft relative to breadth of distal end, P. wetmorei is intermediate between Praemancalla lagunensis and the several species of Mancalla (99% in P. lagunensis, 113% in P. wetmorei, 126-140% in Mancalla).

The prominence of the olecranon immediately distinguishes the ulna of P. wetmorei from all species of Mancalla, but the palmad position of the brachial impression and the shortened lip of the external cotyla assign the element to the subfamily Mancallinae rather than the typical alcids.

The radius (LACM 53907), although short and laterally compressed as in Mancalla, is less bladelike and lacks the prominent crest on its convex contour. The ulnar depression is broader and deeper than in Mancalla. Neither the ulna nor the radius is known for Praemancalla lagunensis. Those assigned to P. wetmorei both show less modification towards a flipperlike wing than in Mancalla, and in this regard are in keeping with the character of the other elements known for Praemancalla.

The radius is 12% longer than the maximum known for any species of Mancalla (see Table 1). Using the radius as a guide, and comparing the relative size of ulna to radius in the type of Mancalla cedrosensis (associated skeletal elements of one individual), it is suggested that the ulna of P. wetmorei attained a length of 36.5 mm.

Carpometacarpus LACM 52216 differs from that of Mancalla and resembles Praemancalla in the presence of a distinct, blunt pisiform process, rounded anterior contour of shaft of metacarpal II and deep narrow groove between the internal and external crests of the trochlea posteriorly. It is distinguished from P. lagunensis by the narrower shaft and the relatively longer process of metacarpal I, with more than half its length distal to the level of the metacarpal symphysis; also, the trochlea extends higher above that process and the lateral surface of the internal crest of the trochlea is more broadly and less deeply depressed.

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the triosseal canal. The greatest overhang of the facet, and the least angular border of the triosseal canal are found in M. cedrosensis; the least overhang, and most angular border of the canal occur in M. californiensis. In no specimen of Mancalla is the furcular facet as ventrally extended as in P. wetmorei. This facet is broken ventrally in the single known coracoid of P. lagunensis, but the portion that remains is deep and has a strong overhang; below the facet, however, the area is broader and more rounded than in P. wetmorei. In direct dorsal view (with dorsal surface of shaft held horizontally) the scapular facet in P. wetmorei is more dorsally and less laterally directed than in Mancalla, and the triosseal canal faces more mediad. Resemblance is closer to Praemancalla lagunensis, although the canal is even more medially directed in the latter species. The attachment of the coracohumeral muscle in P. wetmorei is broad, flat and angular in outline at its anterior end, as in P. lagunensis, but is relatively longer, and narrows near the glenoid facet. In Mancalla the attachment is narrow and rounded.

Conclusions

Four wing elements and a coracoid from three correlative localities of Late Miocene age in Laguna Niguel, Orange County, California, represent a new species, Praemancalla wetmorei, in the alcid subfamily Mancallinae. The degree of specialization towards a flipperlike wing is less than in the Pliocene genus Mancalla, and reflects a stage of development closer to the Miocene genus Praemancalla. Differences noted with respect to Praemancalla lagunensis, however, suggest a slight advance towards the more specialized wing of Mancalla. The humerus is more compressed, the triosseal canal of the coracoid more dorsally rotated and narrower, and the process of metacarpal I of the carpometacarpus longer.

This suggested evolutionary trend is in keeping with the evidence presented by the associated faunas of the localities involved, which indicates a slightly greater age for the type-locality of P. lagunensis ~~(LACM locality 1945)~~ than for the Laguna Niguel sites.

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Plate 1.-- Skeletal elements of Praemancalla and Mancalla. a, b, P. wetmorei, coracoid 37637 medial and dorsal views; c, P. lagunensis, coracoid 15289 dorsal view; d, M. diegense, coracoid 2310 dorsal view; e, f, g, P. wetmorei, ulna paratype 32429 internal view, carpometacarpus 52216 internal view, radius 53907 palmar view; h, M. cedrosensis, humerus 15367 palmar view; i, j, P. wetmorei, humerus holotype 42653 palmar and anconal views; k, P. wetmorei, humerus 32432 anconal view; l, M. diegense humerus 2331, anconal view; approximately natural size. Catalog numbers from LACM series.

A New Species of Flightless Auk from the Miocene of California (Alcidae: Mancallinae)

Hildegarde Howard

Abstract

Praemancalla wetmorei is described from the Late Miocene of Orange County, California, with humerus and ulna as holotype and paratype, and radius, carpometacarpus, and coracoid referred. The species, although less ~~highly~~ specialized as a flightless diver than the geologically younger genus Mancalla, appears to be more advanced than Praemancalla lagunensis, which is believed to be derived from slightly older deposits.

Hildegarde Howard, Chief Curator Emeritus, Natural History Museum of Los Angeles County, 900 Exposition Blvd., Los Angeles, California 90007.

Introduction

Since Lucas (1901) described the first humerus of Mancalla, knowledge of the flightless mancalline alcids (Mancallinae) has increased to include nearly all skeletal elements and to involve five species and two genera.

The type-genus, Mancalla, is known from four species, M. californiensis Lucas (1901), M. diegense (Miller, 1937), M. milleri Howard (1970) and M. cedrosensis Howard (1971) and is recorded from Humboldt County in northern California to Cedros Island, Mexico. The Humboldt County site, with a single humerus assigned to M. diegense (Howard, 1970), is believed by Kohl (1974:217) to be Pleistocene in age. The other records are Middle to Late Pliocene. Praemancalla is known from the single species, P. lagunensis Howard (1966), described from a Late Miocene deposit in Leisure World, Laguna Hills, Orange County, California.

Recently, three other Miocene sites in Orange County have yielded mancalline bones. These sites are in Laguna Niguel, approximately 3 miles south of the Laguna Hills locality. The specimens from these sites are in the collections of the Natural History Museum of Los Angeles County. The catalog and locality numbers are listed under Los Angeles County Museum (LACM).

The associated avifauna from these sites includes the same families recorded at the type-locality of Praemancalla lagunensis (LACM Loc. 1945), but the species represented are not identical. None of the species described as new from locality 1945 has appeared in the Laguna Niguel localities. On the basis of associated marine mammals, it is suggested that these sites may represent a later subdivision of the Late Miocene than Local 1945 (Barnes et al., in preparation).

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The mancalline skeletal elements from Laguna Niguel include humerus, ulna, radius, carpometacarpus, and coracoid, all of which have been previously described for Mancalla. Only for the carpometacarpus, coracoid, and distal end of the humerus is there comparable material of Praemancalla. The newly found specimens suggest a generally larger form than any previously described mancalline species. Qualitative characters show distinction from comparable elements of all species of Mancalla. Distinctions are also apparent with respect to Praemancalla lagunensis, but the degree of adaptation towards restriction of the wings for swimming is closer to Praemancalla than to Mancalla. Possibly a third genus is indicated. At the present state of knowledge, however, it seems wiser to assign the specimens to the genus Praemancalla under a new species name.

Acknowledgments.- I am grateful to the Earth Sciences Division of the Natural History Museum of Los Angeles County for placing the Museum's collections at my disposal and for the many courtesies of the staff members. I particularly appreciate the assistance of Dr. Lawrence Barnes in discussion of matters pertaining to the field work in Orange County. The photographs were taken by Lawrence Reynolds, Museum Photographer. Special thanks go to my husband, Henry Anson Wylde, for the art work in connection with the preparation of the plate.

Praemancalla Howard

~~Description~~

In describing *Praemancalla lagunensis*, the specific diagnosis of the holotype humerus and paratype carpometacarpus served also as the generic diagnosis. In the specimens from Laguna Niguel now at hand, the following characters are in agreement with that diagnosis:

Humerus with groove separating base of ectepicondyle from external condyle, brachial impression faint and running diagonally from ectepicondylar prominence to a point slightly proximal to attachment of articular ligament, with no papilla present above condyles. The tricipital grooves and ridges are broken in the humerus from Laguna Niguel, so the characters of this area set forth in the original diagnosis cannot be assessed.

Carpometacarpus with distinct, blunt pisiform process, trochlear area having narrow, deep groove between internal and external crests posteriorly, metacarpal 2 relatively broad with more rounded anterior contour and more angular internal contour than in *Mancalla*, and process of metacarpal I relatively shorter.

The following additional characters observed in the specimens now at hand are considered to be of generic value when compared with *Mancalla*: humerus with head only slightly extended over capital groove, deltoid crest weakly developed, area of anterior articular ligament slightly swollen; ulna with prominent olecranon process; radius lacking prominent crest on convex contour; coracoid with scapular facet facing dorsally, coracohumeral attachment flat and angular in outline.

Praemancalla wetmorei new species

Holotype.-- Humerus LACM 42653, complete except for tricipital area of distal end (Plate 1i,j).

Type-Locality.-- LACM Loc. 6906, site of excavation for North American Rockwell building (now U.S. General Services Administration building) on El Lazo Road, Laguna Niguel, Orange County, California; ~~3000 feet~~ 920 m north of junction of Aliso Creek and Sulfur Creek, in yellow sands and laminated gray shale. Latitude 33°33'43" north, longitude 117°42'44" west. In the NE 1/4 NE 1/4 SE 1/4 of unsurveyed Sec 16, T7s, R8W, San Juan Capistrano quadrangle, USGS 1948, 1:24000.

Formation and Age.-- Monterey Formation, Late Miocene.

Paratype.-- Proximal end of ulna LACM 32429 from type-locality (Plate 1e).

Diagnosis.-- Humerus broad proximally; medial profile of capital groove a wide open curve; depth through deltoid crest only 5% greater than depth of shaft above distal end; ectepicondylar prominence notably protuberant at its proximal tip and slightly lateral in position with respect to palmar surface of shaft; groove between external condyle and base of ectepicondyle more constricted and less distal in extent than in P. lagunensis; shaft breadth above ectepicondylar prominence 53% of shaft depth at same point; shaft depth 113% of breadth of distal end.

Ulna laterally compressed, with short brachial impression partially palmad in position and bordered palmad by heavy ridge; olecranon blunt but protruding proximally beyond cotylae and distinctly set off from cotylae by lateral depression both externally and internally.

Measurements.-- Humerus: length to external condyle 82.7 mm, greatest proximal breadth from pectoral to bicipital crests 22.2 mm, breadth across head 19.6 mm, breadth through distal condyles 8.5 mm, breadth and depth of shaft above ectepicondylar prominence 5.1 mm and 9.6 mm respectively, height of ectepicondylar prominence above distal end 16.9 mm, greatest depth through deltoid crest 10.1 mm, breadth of shaft at same point 5.5 mm. Ulna: proximal breadth across cotylae 7.5 mm, proximal depth through olecranon 11.3 mm, breadth and depth at middle of shaft 4.2 mm and 6.2 mm respectively.

Referred Material.-- From Laguna Niguel, Orange County, California, Late Miocene, Monterey Formation. Proximal end of humerus LACM 32432 (Plate 1k) from type-locality (LACM 6906). Complete radius LACM 53907 (Plate 1g) and scapular end of coracoid (Plate 1a,b) LACM 37637 from LACM locality 6902 at northwest end of El Lazo Road, ~~1200 feet~~ northwest of type-locality and ~~800 feet~~ east of Aliso Creek, in basal ~~2-4 feet~~ of coarse yellow sand directly overlying laminated gray shale. Proximal 3/4 of carpometacarpus LACM 52216 (Plate 1f) from LACM locality 3185, in tributary gully west of Aliso Creek in coarse yellow sand.

Etymology.-- I take pleasure in naming this new species in honor of Dr. Alexander Wetmore who has done so much to further the science of paleornithology, and who has generously given advice and counsel to me throughout my years of study in this field.

~~Characteristics~~ Descriptions.-- Compared with Mancalla, the humerus of P. wetmorei is relatively, as well as actually, broader both proximally and distally (ratio of greatest proximal breadth to length 26.8% in P. wetmorei, 23%-25% in Mancalla; ratio of distal breadth to length 10.2% in P. wetmorei,

8.2% - 9.6% in Mancalla) and exceeds in length all but one specimen of Mancalla (the maximum of M. diegense). It is, however, 8% longer than the average for M. diegense and 12% longer than the average for M. cedrosensis (see Table 1), and 32% longer than the much smaller M. milleri.

The lesser protrusion of the head over the capital groove is reflected in the wide, open curve between the head and internal tuberosity as seen in palmar and anconal views; this condition contrasts with the narrow, U-shaped curve found in Mancalla (see Plate 1h - 1). Further distinction from Mancalla is seen in the deltoid crest which, in P. wetmorei, describes a low, even arc and is not expanded towards its distal termination. Distally, the greater breadth of the humerus is observed not only in the width through the condyles but also in a slight expansion in the region of the attachment of the anterior ligament. In this character, as well as in the lateral slant of the brachial impression and absence of a prominent papilla above the condyles, P. wetmorei resembles Praemancalla lagunensis. It is distinguished from that species in the greater projection of the ectepicondylar prominence from the shaft, narrower groove between the base of the ectepicondyle and external condyle, and relatively narrower and deeper shaft (relative breadth to depth of shaft 53% in P. wetmorei, 66% in P. lagunensis). In depth of shaft relative to breadth of distal end, P. wetmorei is intermediate between Praemancalla lagunensis and the several species of Mancalla (99% in P. lagunensis, 113% in P. wetmorei, 126-140% in Mancalla).

The prominence of the olecranon immediately distinguishes the ulna of P. wetmorei from all species of Mancalla, but the palmad position of the brachial impression and the shortened lip of the external cotyla assign the element to the subfamily Mancallinae rather than the typical alcids.

The radius (LACM 53907), although short and laterally compressed as in Mancalla, is less bladelike and lacks the prominent crest on its convex contour. The ulnar depression is broader and deeper than in Mancalla. Neither the ulna nor the radius is known for Praemancalla lagunensis. Those assigned to P. wetmorei both show less modification towards a flipperlike wing than in Mancalla, and in this regard are in keeping with the character of the other elements known for Praemancalla.

The radius is 12% longer than the maximum known for any species of Mancalla (see Table 1). Using the radius as a guide, and comparing the relative size of ulna to radius in the type of Mancalla cedrosensis (associated skeletal elements of one individual), it is suggested that the ulna of P. wetmorei attained a length of 36.5 mm.

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Figure 1.--Skeletal elements of Praemancalla and Mancalla: a, b, coracoid (LACM 37637) of P. wetmorei, new species, medial and dorsal views; c, coracoid (LACM 15289) of P. lagunensis, dorsal view; d, coracoid (LACM 2310) of M. diegense, dorsal view; e, paratype ulna (LACM 32429) of P. wetmorei, ~~new species,~~ internal view; f, carpometacarpus (LACM 52216) of P. wetmorei, internal view; g, radius (LACM 53907) of P. wetmorei, palmar view; h, humerus (LACM 15367) of M. cedrosensis, palmar view; i, j, holotype humerus (LACM 42653) of P. wetmorei, palmar and anconal views; k, humerus (LACM 32432) of P. wetmorei, anconal view; l, humerus (LACM 2331) of M. diegense, anconal view. (Approximately natural size.)

TABLE 1.— Skeletal Measurements ~~(in millimeters)~~ of *Praemancalla wetmorei* compared with *P. lagunensis*, *Mancalla diegense*, *M. cedrosensis*, *M. californiensis*.

Character	*Praemancalla*		*Mancalla*						
	P. wetmorei	*P. lagunensis*	*M. diegense*			*M. cedrosensis*			*M. californiensis**
			min.	mean	max.	min.	mean	max.	
Humerus									
Length	82.7	...	71.0	76.5	85.2	69.5	73.5	80.0	...
Greatest proximal breadth	22.2	...	17.3	18.7	20.3	17.0	17.9	20.1	19.4
Distal breadth	8.5	7.8	6.4	6.7	8.0	6.9	7.0	7.2	...
Ulna									
Proximal depth	11.3	...	9.0[a]		9.3	8.8	9.7	10.2	9.9
Proximal breadth	7.5	...	5.9	6.4	6.6	6.2	6.6	7.2	6.5
Radius									
Greatest length	35.8	...	29.6	30.9	31.8	27.3	29.3	31.1	29.7
Greatest shaft depth	5.8	...	6.3	6.35	6.4	5.4	5.6	6.1	6.8
Shaft breadth	3.0	...	2.3	2.5	2.7	2.5	2.6	2.8	2.3
Carpometacarpus									
Length process Metacarpal I	15.7	14.0	15.2	15.3	15.5	15.4	15.6	16.0	17.1
Proximal depth	12.1	11.9	9.7	10.3	11.0	10.2	10.5	11.1	11.2
Shaft breadth	4.3	4.5	3.1	3.4	3.7	3.4	3.5	3.8	3.4
Coracoid									
Length from below scapular facet to head	20.9	18.8	15.4	17.3	19.5	15.2[a]		16.7	18.8
Breadth below furcular facet	5.8	6.0	5.4	5.8	6.3	5.2	5.5	6.0	5.9
Breadth furcular facet	10.3	...	7.3	7.8	8.6	7.1[a]		7.3	8.7

*/ Only one specimen of each element of *M. californiensis*, except carpometacarpus (average of four).

[a] Only two specimens measurable for this dimension.